Pre-Proposal Meeting Agenda

CSP #208290 – DAVID W. CARTER HIGH SCHOOL – Addition and Renovation

Date & Time: Monday, January 05, 2026, at 10:00 AM (Virtual) and 04:00 PM (In-person)
Location (*site-walk*): David W. Carter High School, 1819 W. Wheatland Road, Dallas, TX 75232

1. Introduction: (Michael Evans, Project Manager)

Welcome attendees on behalf of Dallas ISD Construction Services and Dallas Independent School District.

Project Goal: Deliver a project fulfilling program requirements as defined by Education Specifications, Technical Design Guidelines, in accordance with the contract documents, applicable regulations, on time and on budget.

Introduction of Project Team:	Dikita Enterprises, Inc
Dallas ISD Construction Services	Dorion Hasty, Dallas ISD, Contract Manager Tara Lott, Dallas ISD, Director of Procurement Services Deborah Burkhalter-Ellis, Dallas ISD, Procurement Services William French, Dallas ISD, Director of Safety & Quality
A/E Firm	PBK Architects
SBO	Wilton Munnings, Dallas ISD, SBO Program Manager Josh Berrios, Dallas ISD, SBO Coordinator Tameka Sadler, SSP Consulting, Bond Consultant
Program Management Team	Walter Dansby, Program Director Stephanie Rodriquez, Controls Manager Michael Evans, Project Manager Vernon Mullen, SBO Coordinator

Attendance Verification: Distribution of the sign-in sheet or remind all to sign into the MS Teams Chat to provide contact information.

Project Manual Front End Document, Section 00 11 17: Intention to Propose Form - if your firm will be submitting a proposal for this project, please submit this form to the attention of: Dallas ISD Procurement Services c/o Bond/Construction Services at Email: ProcurementCS@dallasisd.org

Pre-Proposal Meeting Agenda

CSP #208290 – DAVID W. CARTER HIGH SCHOOL – Addition and Renovation

Project Information:

1. **Dallas Independent School District Bond Program**
2. **CSP Package**: **CSP 208290 - Org 023 - DAVID W. CARTER HIGH SCHOOL - Addition and Renovation**

2. Procurement Process: (Deborah Burkhalter-Ellis)

Procurement/Bidding documents: Available to both GCs and Subs for purchase at: **THOMAS PRINTWORKS** (Attention: **JON SAUVE**), **3610 Oak Lawn Avenue, Dallas, TX 75219**. Phone**: 214-880-0022** Email: **Jon.Sauve@thomasprintworks.com**. Documents are also available at Plan Rooms for viewing (see page # of this agenda).

Communications: **All questions during the bidding process are to be submitted in writing to:**
Attention: Dallas ISD Procurement Services
Email: procurementcs@dallasisd.org

Responses to questions will be given via addenda only. Any addendum issued will be listed or posted at the Dallas ISD Construction Services website http://www.dallasisd.org. Click on "Departments", click on "Construction Services/Bond Office"; click on "Bond Vendor Opportunities", then click on the bid package number. The printers will issue any addenda to all registered plan holders. The addenda will also be listed on DISD's website.

Critical Bidding Dates:

Last Day for receiving questions from Contractors:	January 12, 2026, close of business.
Last Day for issuing Addenda:	January 19, 2026, close of business.
Proposal due Date/Time and Location:	February 03, 2026, at 2:00 PM CST February 04, 2026, at 3:00 PM CST

Proposal due Date/Time and Location: Construction Services Office, **9400 North Central Expwy, 8th Floor, Dallas, Texas, 75231. Please be aware that there is a new check-in policy for this building. If you do not have your DISD Bond badge, you will have to check in at the welcome desk, which can take anywhere between 10-20 minutes.**

- Receipt of Proposals (**Part 1-A, 1-B, and Part 1-C**) DISD Bond Office: **Tuesday, February 03, 2026, at 2:00 PM CST.**
- Receipt of **(Part 2)** at DISD Bond Office: **Wednesday, February 04, 2026, at 3:00 PM CST time.**
- Proposal Opening and Public Reading by **Microsoft Teams** at the Dallas ISD Bond Office **Wednesday, February 04, 2026, and Microsoft Teams Meeting ID: 270 307 139 537 1 Passcode: J2pi2PL6 at 3:30 PM local time**. All proposers are welcome to join us in person for the opening.

Proposal Packaging: (Deborah Burkhalter-Ellis)

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CSP Process - Gives the District the ability to identify the Best Value Bidder for the project, not necessarily the low bidder – Cost carries 40% of the weight. The Evaluation Criteria are published in the Project Manual for this CSP in Section 00 21 13 under the Instruction to Proposers.

- Explain Selection Criteria – Scoring based on data provided only.
- Do not miss the information. No subjectivity. Do not leave any blanks.
- The Evaluation Committee will contact the references provided two times only.

Post Bid:
Target Board Approval Meeting – **March 23, 2026**

3. Safety Program: (William French or Safety Representative)

- Ensure to include in the bid package the Current EMR/Letter from the Insurance carrier.
- Submit Contractor's safety plan, or DISD's Minimum Safety Guidelines can be adopted. Be sure to mark in the technical proposal if you are adopting the DISD Manual.
- If you are adopting the Minimum Guidelines, it should be noted on your company letterhead and submitted with the Proposal.
- Safety Coordinator qualifications and percentage on the project.

All bidders to note:

- The contractor is ultimately responsible for safety.
- A Site-Specific Safety Plan must be developed and implemented post-award by the selected Contractor.
- A Site Specific Safety Orientation must be developed and implemented post-award by the selected Contractor.
- Approved Barriers: Outdoor 6 Ft Chain link fence/ Indoor: Hardcover, Plywood, Drywall
- Badges are required at all times.
- The project in this package is not a greenfield site.
- *Awarded Contractor must develop a site-specific COVID-19 Exposure Prevention, Preparedness, and Response that can help guide protective actions against COVID-19. The plan must be based on information available from the CDC, OSHA, and all applicable public officials.*

4. SBE Program Requirements: (Vernon Mullen, SBO Coordinator)

- District's SBE aspirational goal is 30% for construction-related projects.
- SBE Compliance Guidelines and Forms are required for all solicitations over $50,000.
- The SBO team is available to provide lists of certified SBE subcontractors upon request.
- Bonding and Technical assistance will be provided by SSP Consulting, LLC, Office: (214) 220-9098 or (972) 725-7318 to SBEs and small business owners interested in bidding on district construction projects as a prime contractor or subcontractor. Tameka Sadler (C49893@dallasisd.org, tsadler@sspconsulting.com) is the point of contact.
- Failure to submit a signed SBE Compliance Guidelines and Forms package to the District by 3:00 p.m. on Bid Day 2 will result in a loss of points.
- PMF SBO Coordinator **Vernon Mullen**, **972.925.7243, C88218@dallasisd.org**

5. Contract Issues: (**Deborah Burkhalter-Ellis**)

- General Contractor AIA contract template. No changes will be allowed.
- Contract Time: **Target substantial completion: 14 months after NTP, 2027**
- Project Construction Budget including all allowances: **Total CCL: $4,215,500.00**

6. Specific Project Requirements: (Daniel Berger)

- Critical phasing Phase I, Phase II
- Substantial completion date for this school
- School Calendar
- Construction staging area.
- Swing space
- Coordination with other Contractors & Vendors: Atmos, Oncor, Technology, etc.
- Noise control.
- Custodian overtime costs
- Respect the community, neighborhoods, and City requirements.

Scope of Work: (Daniel Berger)

1. Addition:
   a. New 8,000sf attached addition.
   b. New dance room and black box.
   c. New MEP and Fire Safety items.
2. Demolition of select flatwork and build back.
3. Minor interior renovation of existing high school.
   a. Areas to be affected will be corridors, new wall finishes, ceilings, and light fixtures.
   b. Existing HVAC, fire alarm and sprinklers to remain but will be relocated and extended to new surfaces as needed.

Walk Through Schedule: (Michael Evans, Project Manager)
ORG # School Name: Org 023 – David W. Carter High School
Time of site walk: 4:00 PM CST
School Address: 1819 W. Wheatland Road, Dallas, TX 75232
Location of Meeting: (i.e., auditorium, cafeteria, front office)

7. Questions & Answers

Please send your questions in writing to: procurementcs@dallasisd.org

NOTE! Any questions answered during this preproposal meeting are not binding unless formalized in an addendum to the solicitation.

DALLAS INDEPENDENT SCHOOL DISTRICT
CONSTRUCTION SERVICES

Project Manual

VOLUME 2 OF 2

CSP 208290

ORG023 – DAVID W. CARTER HIGH SCHOOL – ADDITION AND RENOVATION

A/E FIRM
PBK

MEP: JONES DBR
STRUCTURAL ENGINEER: CHARLES GROJER AND ASSOCIATES, INC
CIVIL ENGINEER: SIMON ENGINEERING AND CONSULTING

ACOUSTICAL/AV ENGINEER: WJHW
TECHNOLOGY ENGINEER: LEAF ENGINEERS
BUILDING ENVELOPE: BEAM PROFESSIONALS

December 21, 2025

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CSP 208290

ORG 023 – DAVID W. CARTER HIGH SCHOOL – ADDITION AND RENOVATION

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PBK

December 21, 2025

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CONSTRUCTION SERVICES

Project Manual

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ORG023 – DAVID W. CARTER HIGH SCHOOL – ADDITION AND RENOVATION

A/E FIRM
PBK

MEP: JONES DBR
STRUCTURAL ENGINEER: CHARLES GROJER AND ASSOCIATES, INC
CIVIL ENGINEER: SIMON ENGINEERING AND CONSULTING

ACOUSTICAL/AV ENGINEER: WJHW TECHNOLOGY ENGINEER: LEAF ENGINEERS
BUILDING ENVELOPE: BEAM PROFESSIONALS

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ORG 023 – DAVID W. CARTER HIGH SCHOOL – ADDITION AND RENOVATION

A/E FIRM
PBK

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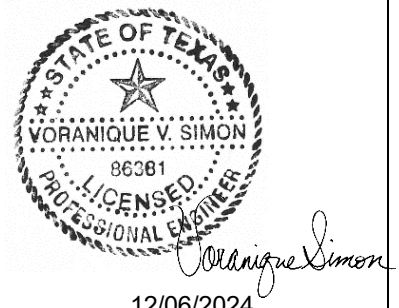
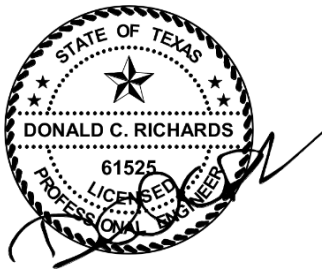
SECTION 00 01 07 – SEALS PAGE

Issue for Permit

Each specification section included herein is listed in the Project Manual Table of Contents with a letter code, indicated below, designating the Designer of Record responsible for its preparation, under whose seal and/or authority it is issued for the purpose(s) stated above. Seals and signatures do not apply to documents not included herein, nor (except as otherwise indicated) to documents prepared by the Owner or others ("O"), including but not necessarily limited to documents in Division 00, geotechnical and other reports, etc.

Architect of Record: Daniel Berger 25370	 12/06/2024	PBK Architects 14001 Dallas Parkway, #400 Dallas, Texas 75240 Phone: (972) 233-1323
Engineer of Record, Civil: Name: Voranique Simon P.E. # 86381	 12/06/2024	Simon Engineering & Consulting 15443 Knoll Trail Drive #200 Dallas, Texas 75248 Phone: (214) 466-7870
Engineer of Record, Structural: Charles Gojer P.E. #33348	 12/06/2024	Charles Gojer and Associates, Inc. 11615 Forest Central Dr., #303 Dallas, Texas 75243 Phone: (214) 340-1199
Engineer of Record, Mechanical, Electrical, & Plumbing: Ryan G. Miller 131259		Jones DBR 5000 Quorum Drive #400 Dallas, Texas 75254 Phone: (214) 217-9500

SECTION 00 01 07 – SEALS PAGE

Engineer of Record, Technology: Name: Donald Richards, P.E. P.E. # 61525	 12/06/2024	LEAF Engineers 14001 Dallas Parkway #400 Dallas, Texas 75240 Phone: (972) 233-1323

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23 05 13 Common Motor Requirements for HVAC Equipment

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23 05 53	Identification for HVAC Piping and Equipment
23 05 93	Testing, Adjusting and Balancing – Spec title says 23 05 93 - verify
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SECTION 00 01 15 – LIST OF DRAWING SHEETS

The list below is a description of the documents provided to the contractor as part of this Request for Competitive Sealed Proposal – 208290

1.01 Drawing List with Revision Number and Date: August 25, 2024

1.01.A Project Manual List with Revision Number and Date: August 25, 2024

ORG 023 – DAVID W. CARTER HIGH SCHOOL – ADDITION AND RENOVATION

Drawings:

General:

G-000	COVER SHEET
G-001	INDEX & GENERAL PROJECT INFORMATION
G-020	ACCESSIBILITY GUIDELINES
G-030	FIRE RATED ASSEMBLIES
G-031	FIRE RATED ASSEMBLIES
G-101A	1ST LEVEL - CODE COMPLIANCE PLAN
G-101B	1ST LEVEL - LIFE SAFETY / EGRESS PLAN

Civil:

C03.01	DEMOLITION PLAN
C04.01	SITE PLAN
C04.02	SIDEWALK DETAILS

Structural:

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S-102	GENERAL NOTES CONTINUED
S-103	REQUIRED SPECIAL INSPECTIONS
S-201	LEVEL 1 FLOOR FRAMING PLAN
S-202	BLACK BOX LEVEL 2 FRAMING PLAN
S-203	BLACK BOX ROOF FRAMING PLAN
S-301	FOUNDATION SECTIONS
S-302	FOUNDATION SECTIONS
S-401	FRAMING SECTIONS
S-402	FRAMING SECTIONS
S-403	FRAMING SECTIONS
S-404	ROOF FRAMING AND GRID HANGER SECTIONS AND DETAILS
S-501	CONCRETE BEAM & SLAB SCHEDULE & DETAILS
S-502	X-BRACE ELEVATIONS
S-601	TYPICAL DETAILS
S-602	TYPICAL DETAILS
S-603	TYPICAL DETAILS

Architectural:

ASD101	DEMOLITION ARCHITECTURAL SITE PLAN
AS100	ARCHITECTURAL SITE PLAN & DETAILS
AD101	1ST FLOOR DEMOLITION PLAN - COMPOSITE
AD101B	1ST FLOOR DEMOLITION PLAN - AREA B
AD201	1ST FLOOR DEMOLITION CEILING PLAN - COMPOSITE
AD201B	1ST FLOOR DEMOLITION CEILING PLAN - AREA B
A-101	1ST FLOOR PLAN - COMPOSITE
A-101A1	BLACK BOX LEVEL 1 FLOOR PLAN AND SCHEDULES
A-101A2	BLACK BOX LEVEL 2 FLOOR PLAN AND SCHEDULES
A-101B1	1ST FLOOR SCHEDULES - AREA B
A-101B	1ST FLOOR PLAN - AREA B

A-201	1ST FLOOR CEILING PLAN - COMPOSITE
A-201A1	BLACK BOX LEVEL 1 FLOOR CEILING PLAN
A-201A2	BLACK BOX LEVEL 2 FLOOR CEILING PLAN
A-201B	1ST FLOOR CEILING PLAN - AREA B
A-301	ROOF PLAN - COMPOSITE
A-302	ROOF PLAN - ENLARGED, NOTES & DETAILS
A-304	TYPICAL BUILDING ENVELOPE DETAILS
A-401	ENLARGED FLOOR PLANS
A-410	STAIR DETAILS
A-501	EXTERIOR ELEVATIONS
A-521	INTERIOR ELEVATIONS
A-522	INTERIOR ELEVATIONS
A-601	BUILDING SECTIONS & PARTIALS
A-621	WALL SECTIONS
A-622	WALL SECTIONS
A-701	DETAILS
A-711	WALL SECTIONS DETAILS
A-712	WALL SECTIONS DETAILS
A-731	CEILING DETAILS
A-801A	PARTITION TYPES
A-811	DOORS - WINDOWS PANEL & FRAME TYPES
A-812	DOOR DETAILS
A-821	WINDOW, CURTAINWALL & STOREFRONT ELEVATIONS
A-831	WINDOW & LOUVER DETAILS
A-851	CASEWORK DETAILS
AF100A	FINISH SCHEDULE - EXTERIOR
AF100B	FINISH SCHEDULE - INTERIOR
AF101	1ST FLOOR FINISH PLAN - COMPOSITE
AF101A	BLACK BOX 1ST FLOOR FINISH PLAN - AREA A
AF101B	1ST FLOOR FINISH PLAN - AREA B
AF102A	BLACK BOX 2ND FLOOR FINISH PLAN - AREA A

Mechanical:

M001	MECHANICA SYMBOL LEGEND
MEP102	MEP ROOF PLAN
MD313	ENLARGED MECHANICAL DEMOLITION PLAN - SCENE ROOM
M311	ENLARGED MECHANICAL PLAN - BLACK BOX LEVEL 1
M312	ENLARGED MECHANICAL PLAN - BLACK BOX LEVEL 2
M313	ENLARGED MECHANICAL PLAN - SCENE ROOM
M501	MECHANICAL SCHEDULES
M502	MECHANICAL SCHEDULES
M601	MECHANICAL DETAILS
M701	MECHANICAL CONTROLS

Electrical:

E001	ELECTRICAL SYMBOL LEGEND
E002	ELECTRICAL GENERAL NOTES
ELD315	ENLARGED ELECTRICAL POWER DEMOLITION PLAN - SCENE SHOP
EPD315	ENLARGED ELECTRICAL LIGHTING DEMOLITION PLAN - SCENE SHOP ROOM
EL311	ENLARGED ELECTRICAL LIGHTING PLAN - BLACK BOX LEVEL 1
EL312	ENLARGED ELECTRICAL LIGHTING PLAN - BLACK BOX LEVEL 2
EL315	ENLARGED ELECTRICAL LIGHTING PLAN - SCENE SHOP ROOM
EP311	ENLARGED ELECTRICAL POWER PLAN - BLACK BOX LEVEL 1
EP312	ENLARGED ELECTRICAL POWER PLAN - BLACK BOX LEVEL 2
EP315	ENLARGED ELECTRICAL POWER PLAN - DANCE ROOM

E401 ELECTRICAL ONE-LINE DIAGRAM
E501 ELECTRICAL SCHEDULES
E601 ELECTRICAL DETAILS

Plumbing:
P001 PLUMBING SYMBOL LEGEND
PD311 ENLARGED PLUMBING DEMOLITION PLAN - AUDITORIUM LEVEL 1
P311 ENLARGED PLUMBING PLAN - BLACK BOX LEVEL 1
P312 ENLARGED PLUMBING PLAN - BLACK BOX LEVEL 2
P313 ENLARGED PLUMBING PLAN - AUDITORIUM LEVEL 1
P314 ENLARGED PLUMBING PLAN - CRAWL SPACE
P501 PLUMBING SCHEDULES

Technology:
TL-000 GENERAL NOTES AND LEGENDS
TL-101A2 BLACK BOX LEVEL 2 FLOOR PLAN
TL-602 DETAILS
TL-1601 THEATRICAL LIGHTING AND CONTROL RISER
TR-000 GENERAL NOTES AND LEGENDS
TR-101A2 BLACK BOX LEVEL 2 FLOOR PLAN
TR-601 SECTION

Acoustical/Audio-Visual
AV-000 GENERAL NOTES AND LEGENDS
AV-101A2 BLACK BOX LEVEL 2 FLOOR PLAN
AV-501 ELEVATION
AV-1100 AUDIO-VIDEO FUNCTIONAL LEGEND
AV-1110 BLACK BOX DETAILS

Procurement Services December 21, 2025

The Dallas Independent School District ("District") is soliciting Competitive Sealed Proposals ("CSP") from qualified sources relative to the provision of the following request For Competitive Sealed Proposals ("CSP"). This procurement will be managed under the Dallas ISD Construction Services department.

For information on how to obtain the CSP documents, go to the District's **Construction Services** website **http://www.dallasisd.org. Click on "Departments;" click on "Construction Services/Bond Office;" click on "Bond Vendor Opportunities;"** then click on the bid package number. Follow the Document Distribution instructions to obtain the CSP documents. The CSP documents contain the necessary information to submit a CSP to the District, including construction documents, selection criteria, estimated budget, project scope, schedule, and other information that contractors may require to respond to the request.

Please return the "Intention to Propose" form (Specification Section 00 11 17) to the Construction Services Procurement Director listed on the form.

CSP #	Description	Closing Date	Buyers Initials
208290	DAVID W. CARTER HIGH SCHOOL – ADDITION AND RENOVATION	February 03, 2026	DBE

A pre-proposal meeting will be held at 10:00 AM on January 05, 2026, via Teams for all interested parties. This meeting is not mandatory, but information discussed will be extremely helpful in preparation of the proposal.

Join Teams Meeting
Meeting ID: 232 741 276 232 3
Passcode: PY2Vn6fc

All general contractors and sub-contractors are encouraged to attend this meeting. Contractors will meet A/E(s) and PM at the school to start site tours. The first site tour will take place immediately following the pre-proposal. The following is the schedule for each site tour:

School Org#	School Name	Date	Time	School Address, Location of Meeting
023	DAVID W. CARTER HIGH SCHOOL	January 05, 2026	4:00 PM	1819 W. Wheatland Road Dallas, TX 75232

All Construction Services procurements must be physically delivered to the Construction Services office, at the Linus D. Wright Dallas ISD Administration Building 9400 North Central Expressway, Suite 800 Dallas, TX 75231. (Call 972.925.7200 for directions). Delivery to other locations will result in rejection of a CSP.

Completed CSP Package **Part 1-A, 1-B and 1-C are due on Tuesday, February 03, 2026, at 2:00 PM** (local time).

Completed CSP Package **Part 2 is due on Wednesday, February 04, 2026, at 3:00 PM (**local time).

Any materials received after the respective closing dates / times will not be considered.

The District will open and read the names of the proposers and prices submitted in responsive CSPs beginning at 3:30 P.M. local time upon submittal of Part 2 of the Package, via Teams.

Join Teams Meeting
Meeting ID: 270 307 139 537 1
Passcode: J2pi2PL6

No further information will be officially released until after the date the Agenda is publicized for the Board of Trustees briefing.

The right is reserved to reject any or all bids, proposals, CSPs, or statements of qualification and to waive technicalities.

The Dallas Independent School District is committed to the ideals of equal opportunity in all its business endeavors.

The Dallas Independent School District's Construction Services projects have a 30% Small Business Enterprise (SBE) aspirational goal in construction.

RUN TWO TIMES ONLY AS FOLLOWS:
December 21, 2025, and December 28, 2025

DALLAS INDEPENDENT SCHOOL DISTRICT

PROCUREMENT SERVICES – CONSTRUCTION SERVICES

DOCUMENT DISTRIBUTION

CONSTRUCTION SERVICES

CSP 208290
ORG 023 – DAVID W. CARTER HIGH SCHOOL – INTERIOR RENOVATIONS AND ADDITIONS
J023_P1000_1

SOLICITATION TIMELINE:

Issue Date:	December 21, 2025
First Advertisement Date	December 21, 2025
Second Advertisement Date	December 28, 2025
Preproposal Meeting	January 05, 2026 - Virtual: 10:00 AM - In-Person: 4:00 PM
Question Deadline	January 12, 2026
Question Responses from the District	January 19, 2026
CSP Response Due Dates Pt 1-A, Pt 1-B, and Pt 1-C	February 03, 2026, at 2:00 PM
CSP Response Due Date Pt 2	February 04, 2026, at 3:00 PM
CSP Evaluation	February 10, 2026
Anticipated Board Approval	**March 23, 2026**

1. DOCUMENT DISTRIBUTION:

   The attached "Document Distribution" page details how documents and addenda will be distributed.

2. ESTIMATED CONSTRUCTION BUDGET INCLUDING ALLOWANCES:

   Total Estimated Construction Budget (CCL + IC+ Allowances) for CSP 208290 $4,215,500

3. Scope of Work. The Work consists of:

   ORG 023 – DAVID W. CARTER HIGH SCHOOL - Project consists of the following:

   1. Addition:
      a. New 8,000 sf attached addition

b. New dance room and black box
c. New MEP and Fire Safety items.
2. Demolition of select flatwork and build back.
3. Minor interior renovation of existing high school.
   a. Areas to be affected will be corridors, new wall finishes, ceilings, and lighting fixtures.
   b. Existing HVAC, fire alarm and sprinklers to remain but will be relocated and extended to new surfaces as needed.

4. Contact Information:

Technical questions and all other questions related to this solicitation are to be referred to:

Attention:	**Dallas ISD Procurement Services**
Email:	**ProcurementCS@dallasisd.org**

Please notate the solicitation number **208290** in the subject line of your email.

DOCUMENT DISTRIBUTION
CSP PACKAGE 208290

Documents will be distributed as follows:

Hard copy and file distribution are provided, beginning Sunday, December 21, 2025

Printing Company Name:	**Thomas Printworks**
Attention:	**Jon Sauve**
Address:	**3610 Oak Lawn Avenue**
City, State and Zip	**Dallas, TX 75219**
Phone:	**214-880-0022**
Email:	**Jon.Sauve@thomasprintworks.com**

Any addendum issued will be listed or posted at the **Dallas ISD Construction Services** website http://www.dallasisd.org/ **Click on "Departments"; click on "Construction Services/Bond Office"; click on "Bond Vendor Opportunities"**; then click on the bid package number. Any and all addenda that are too large in size for the website will not be posted on the District website. However, all such addenda will be listed on the website with the date of issuance of each addendum, and instructions to proposers for procuring such addenda from **Thomas Printworks.**

Documents are available as follows:

- **Full size sets of plans and specifications and USB drives of the same information and details are available for purchase at the Printing Company noted above. Purchase price must be obtained directly from the Printing Company.**

- **The purchases of additional USB drives of proposal documents in PDF format are available only to purchasers of at least one (1) full size plans and specifications. Purchase price must be obtained directly from the Printing Company.**

- **Addenda will be available from the Printing Company for purchase. Purchase price must be obtained directly from the Printing Company.**

Delivery pricing can be obtained from **Thomas Printworks.**

The bidder or proposer is responsible for obtaining all Addenda prior to submitting a bid or proposal to the District.

A list of Plan Rooms and other entities that have documents available for viewing are as follows:

DRAWINGS AND SPECIFICATIONS ARE AVAILABLE AT THE FOLLOWING:

Dallas/Fort Worth Minority Supplier Development Council
Sha'Ron Richardson
construction@dfwmsdc.com
214-630-0747
8828 N. Stemmons Freeway, Ste. 550
Dallas, TX 75247

Regional Hispanic Contractors Association
John H. Martinez
john@regionalhca.org
972-786-0909
3918 North Hampton Rd.
Dallas, TX 75212

Regional Black Contractors Association of North Texas, Inc.
John Proctor
info@blackcontractors.org
214-565-8946
2627 Martin Luther King Jr. Blvd,
Dallas, TX 75215

Fort Worth Hispanic Chamber of Commerce
Gilbert Juarez
gilbert@pic-printing.com
https://www.fwhccplanroom.com/
817-625-5411
1327 N. Main Street
Fort Worth, TX 76164

Greater Dallas Hispanic Chamber of Commerce
Gabriela Carvallo
gabriela@gdhcc.com
214-521-6007
1402 N. Corinth St., Ste 225
Dallas, TX 75215

Construction Connect
Michael Stubbs
Content@ConstructConnect.com
800-364-2059
30 Technology Parkway South, Ste 100
Norcross, GA 30092

Dodge Data & Analytics formerly McGraw-Hill Construction Dodge
support@construction.com
877-784-9556
4300 Beltway Place, Ste. 180
Arlington, TX 76018

Dallas Black Chamber of Commerce
Tigist Solomon
tsolomon@dbcc.org
214-702-6652
2922 Martin Luther King Jr. Blvd., Building A, Ste. 104
Dallas, TX 75215

Fort Worth Metropolitan Black Chamber of Commerce
Jeremiah Anderson
janderson@fwmbcc.org
817-871-6558
1150 South Fwy, Ste. 211
Fort Worth, TX 76104

Virtual Builders Exchange, LLC
Heidi Shaffer
heidi@virtualbx.com
210-564-6900
4047 Naco Perrin, Ste.100
San Antonio, TX 78217

SECTION 00 11 17 – INTENTION TO PROPOSE FORM

Please return this Intention to Propose Form within **Five (5) Days** of receipt of this Request for Competitive Sealed Proposal Package. Doing so will enable us to keep a record of interest in this project. It is your responsibility to continue to monitor the District Website for any modifications or addenda issued prior to the submittal deadline. Email this form to:

ATTN: **Dallas ISD Procurement Services c/o Bond/Construction Services**
Linus D. Wright Dallas ISD Administration Building
9400 North Central Expressway, Suite 800
Dallas, TX 75231
E-mail: ProcurementCS@dallasisd.org

Subject: Dallas ISD Construction Services
CSP 208290

Dear **Procurement Services:**

We hereby acknowledge receipt of the proposal documents for the above referenced COMPETITIVE SEALED PROPOSAL (CSP) Package, and confirm that:

(Check appropriate box)

☐ We do intend to submit a proposal for this work. We understand that this proposal will be prepared by us at no cost or obligation to: PBK or Dallas ISD.

☐ We do not intend to submit a proposal on this work. The reason(s) we decline to offer a proposal is as follows:

_____

_____

_____

Yours sincerely,

_____ _____
Name Signature

_____ _____
Firm Title

_____ _____
Phone Date

_____
Fax

_____
Email Address

SECTION 00 21 13 – INSTRUCTIONS TO PROPOSERS

1.01 GENERAL INFORMATION

1.01.1. Scope

In accordance with the Texas Government Code Chapter 2269 the Dallas ISD is requesting Competitive Sealed Proposals (CSP) from general construction contractors. The following instructions by the Dallas Independent School District are intended to afford proposers an equal opportunity to participate in the proposal process.

1.01.2. Discrepancies and Interpretations

Proposer must notify the Architect/Engineer during procurement, at least ten (10) business days prior to the scheduled Proposal opening date, with any questions arising out of the drawings or specifications or if discrepancies, ambiguities or omissions are found in the Proposal documents, or if further information or interpretation is desired.

Answers to inquiries will be provided in writing to all proposers in addenda form. All provisions and requirements of such addenda will supersede or modify affected portions of the Proposal documents. All addenda will be incorporated into and bound with the Contract Documents. No other explanation or interpretation will be considered binding.

1.01.3. Submittal Procedures

Submit the Proposal in sealed packages of sufficient size to hold all of the copies of the Proposal documents. These should be packaged following the instructions in Specification Section 00 41 10 – Overall Proposal Packaging Checklist.

Provide a properly formatted label, using page one of the advertisement, on the exterior of the Proposal envelope or package providing the proposer's identification including due date and time.

If the Proposal is submitted by mail, place the sealed Proposal package in a mailing envelope addressed as required in this section. Delivery of the Proposal prior to the advertised time set for the Proposal opening is the responsibility of the proposer. Dallas ISD is not responsible for mail delivered from the post office.

1.01.4. Preparation of Competitive Sealed Proposals

The Proposal must be based on conditions at the project site, the project Drawings, the project manual and any addenda issued.

All original Proposal Forms must be authoritatively executed and submitted on the Proposal forms furnished by Dallas ISD.

If the **Technical Proposal** form does not provide sufficient space to adequately respond to a question, the proposer should attach additional 8 1/2" X 11" white paper sheets as required, referencing the page and question numbers to which the response pertains.

A Proposal with omissions, alterations, conditions, or carrying riders or other qualifiers which modify the Proposal form may result in the proposal being deemed as non-responsive.

If the proposer chooses to issue a "No Response" (N/R) to a question on the Proposal, an explanation of this action is required. Failure to do so may be viewed by Dallas ISD as incomplete and may subject the entire Proposal to rejection.

Only one proposal shall be submitted by each proposer. If two or more Proposals are submitted, either in one envelope or in separate envelopes, such multiple Proposals will be deemed as non-responsive. The blank Proposal form bound in the Specification is for the proposer's information reference only.

Facsimile or emailed proposals will not be accepted and modifications are not allowed. Any modifications not inside the proposal envelopes/packages will not be considered part of the Contractor's proposal.

The proposer will receive no compensation or reimbursement of expenses incurred in the preparation of this Proposal.

Dallas ISD reserves the right to reject any or all Proposals. Dallas ISD also reserves the right to waive errors and omissions in any proposal if it deems it in the best interest of Dallas ISD to do so.

1.01.5. Public Information and Notice of Confidentiality

Dallas ISD considers all Proposal information, documentation and supporting materials submitted in response to this Request for Competitive Sealed Proposal to be non-confidential and / or non-proprietary in nature, and therefore, shall be subject to the public disclosure under the Texas Public Information Act (*Texas Government Code*, Sec. 552.001, et seq.) after the award of the contract. Exceptions to this are listed in this Project Manual.

The Proposer must identify and designate those portions of their technical Proposal which contain trade secrets or other proprietary data. If the Proposal includes such data, the proposer shall:

Mark the cover sheet of the Technical Proposal with the following phrase: "This Proposal includes data that shall not be disclosed outside Dallas ISD, and the A/E design team and shall not be duplicated, used or disclosed in whole or in part for any purpose other than to evaluate this Proposal."

Mark each sheet and the specific data on that sheet that the proposer wishes to restrict with the following phrase: "Use or disclosure of this specifically marked data is subject to the restrictions regarding confidentiality cited on the cover sheet of this Proposal."

1.01.6. Proposal Guaranty Bond

A Proposal bond on Dallas ISD Proposal Guarantee Bond Form, from a Surety authorized to transact business in the State of Texas, in the amount of not less than ten percent (10%) of the greatest total amount of the proposed contract amount (Base Price plus all Allowances), payable without recourse to the order of the Dallas ISD Board of Trustees, must accompany the Proposal as a guarantee that, if awarded the Contract, the proposer will promptly enter into and execute the Contract and Performance and Payment Bonds on the forms provided.

The Proposal Guarantee Bond must be accompanied by a properly dated and executed Power of Attorney with a raised Surety seal on each document. Failure to do so will constitute an irregular Proposal which may be deemed as non-responsive. Use of a Surety company's bond form is not acceptable and may result in the Proposal being deemed as non-responsive.

Should the successful proposer fail to execute and return to Dallas ISD, the Contract and Bonds within ten (10) calendar days after the date of transmittal of the Contract Documents for execution, the Proposal Guaranty becomes the property of Dallas ISD.

No cashier's checks, official checks, or other items will be accepted. Only a Proposal Guaranty Bond as described in this paragraph for proposal security.

Deadline for Signing Contract and DALLAS ISD's Rights if Delay

The completion of this Project is crucial and must remain on a timely schedule. In order to keep the Project on a judicious schedule, the selected proposer must:

a. Sign the Contract no later than ten (10) calendar days after the date of Board approval when the selected proposer has been notified that it is the successful proposer, and

b. Provide the safety plan for the Project and all required bonds and insurance no later than five (5) business days after the successful proposer has signed the contract.

If the selected proposer fails to meet the district's specified deadline of ten (10) calendar days, the Dallas ISD has the right to:

a. Award the contract to the next successive responsive proposer subject to the district's ranking and evaluation.

1.01.7. Insurance

Original Certificates of Insurance, as well as copies of the original insurance policies and endorsements as required by the contract documents are due not later than 5 business days after execution of contract by the owner.

1.01.8. Ownership of the Competitive Sealed Proposal and Contractor's Proprietary Information

Submitted Proposals, documentation and supporting materials shall become the property of Dallas ISD.

1.01.9. Site Investigation

It is the responsibility of each proposer to examine the project site, existing improvements, and adjacent property and be familiar with existing conditions, and the full scope of the work before submission of a Proposal. By submitting a proposal, the Proposer certifies his acceptance of this requirement.

After investigating the project site and comparing the Drawings and Project Manual with the existing conditions, the proposer should immediately notify the A/E of any conditions for which requirements are not clear; or about which there is any question regarding the extent of the Work involved.

Should the successful proposer fail to make the required investigations and should a question arise after award of contract as to the extent of the Work arising from existing conditions, the A/E will review the issues and make a recommendation to the Project Manager.

Requests for site visits by individual proposers after the formal Pre-Proposal Meeting for the purpose of evaluating and preparing a proposal, will not be accommodated. State law requires proper background checks and badging or accompaniment by District personnel for site visits. It is not practical for the District to provide such accompaniment for individual proposers outside the prescribed Pre-Proposal and Site Visit parameters. Therefore the only viable and appropriate opportunity for viewing the site prior to the proposal date is to attend the Pre-Proposal Meeting and Site Visits.

1.01.10. Evaluation and Contract Award Process

Proposals will be opened publicly to identify the names of the proposer and their respective proposed contract amount (Base Price which includes all Allowances) beginning at 3:00pm Central time upon submittal of Part 2. Other contents of the Proposals will be afforded security sufficient to preclude disclosure of the contents prior to award.

The Proposal Evaluation Committee will evaluate the Proposals. The criteria for evaluation and selection of the successful proposer for this award will be based upon the factors listed in the Evaluation Criteria herein and in the Request for Competitive Sealed Proposal documents.

The Proposal Evaluation Committee consists of the following:

- Construction Services Staff ("CSS")

- SBE (“SBE”)
  DALLAS ISD SBE Program Manager

- Construction Proposal Evaluators (“CPE”)
  Five (5) Owner Representatives and or other in-house staff (as assigned)

- Safety Manager Consultant (“SM”)

After opening the Proposals, the Proposal Evaluation Committee will evaluate and rank each Proposal with respect to the published selection criteria. This ranking will be used to make an advisory recommendation to the Dallas ISD Board of Trustees and is subject to their approval. Per Texas Government Code Ch. 2269, Dallas ISD may negotiate a contract with the selected proposer offers for cost adjustment and other elements of the Proposal. Other than the data read at the Proposal opening, Dallas ISD will endeavor not to disclose any information derived from the Proposals submitted by competing firms in conducting such discussions. The selected Contractor will be required to sign the Dallas ISD Contract form once the district’s Board of Trustees grant the formal recommendation for award at the particular monthly publicly held Board meeting.

If Dallas ISD determines that it is unable to reach a satisfactory agreement with the first ranked proposer, Dallas ISD will formally and in writing, terminate discussions with that proposer. Dallas ISD will then proceed with negotiations with each successive proposer as they appear in the order of ranking until an agreement is reached, or until Dallas ISD has rejected all Proposals. After termination of discussions with any proposer, Owner will not resume discussions with that proposer.

Following execution of a contract agreement between Dallas ISD and the successful contractor(s), the proposers will be notified about the outcome of the selection process.

The award or rejection action regarding this Proposal is at the sole discretion of Dallas ISD. Dallas ISD makes no warranty regarding that a contract will be awarded to any proposer.

If a Contract is awarded, it will be awarded to the proposer offering the best value to Dallas ISD. Dallas ISD is not bound to accept the lowest priced Proposal, if that Proposal is judged and or determined not to be the best value for Dallas ISD.

1.02.1 RECEIPT OF PROPOSALS

See Specification Section 00 41 10 Overall Proposal Packaging Checklist - for packaging instructions and Section 00 11 13 Advertisement for CSP for proposal receipt instructions and details

1.03.1 ADDENDA, ALLOWANCES, ALTERNATES AND UNIT PRICES

Addenda. Contractors are required to acknowledge receipt of all addenda issued prior to the Proposal due date. Failure to acknowledge all addenda in the Proposal Form will result in the Proposal being deemed as non-responsive.

Allowances. Contractors are required to include the Allowances described in Section 01 21 00 in the Base Proposal. Refer to the General, Supplementary and Other Conditions of the Contract for Construction for other related details on allowances.

Contingency Allowance. All construction contracts shall contain an Owner Controlled Contingency Allowance (OCCA). The contingency allowance is to be used only for expenditures which do not require a change order. The contingency allowance may be used to pay for changes in the work including but not limited to those resulting from hidden or unforeseen conditions.
The contingency allowance may be used to pay claims. Use of the contingency allowance must be authorized in advance by the Owner’s Project Manager. Refer to Specification Section 00 41 11, for the contingency allowance. The contractor shall not be entitled to markups or profit related to use of the Owner Controlled Contingency Allowance.

Alternates. Contractors are required to submit prices for the Alternates described in Section 01 23 00 to add work or to deduct work from the Base Proposal. Contractor shall be responsible for any changes in the Work affected by acceptance of Alternates. Refer to Drawings and Technical Specifications Sections for items of work affected by Alternates. Election of Alternates will be exercised at the option of the Owner. Contractor will include as part of each alternate, miscellaneous devices, accessory objects and similar items incidental to, or required for, a complete installation. The amount shown in Specification Section 00 41 12 for each alternate shall include all plant, labor, material, equipment, overhead, profit, insurance and other costs incidental to the performance under the alternate. Failure to provide this information as an alternate is unacceptable and may result in the Proposal being deemed as non-responsive.

Unit Prices. Contractors are required to submit unit prices for any items that are listed in Spec. Section 01 22 00. The amount shown in Specification Section 00 41 12 for each unit price listed task/item shall include all overhead, profit, insurance and other costs incidental to the performance of the listed task/item. Failure to provide the requested unit pricing may result in the Proposal being deemed as non-responsive.

1.04.1 EVALUATION CRITERIA

Evaluation for ranking of firms submitting proposals will be based on the criteria shown in the following table (the weighting of each item by the points shown indicate the relative importance of each item and shall be utilized in the ranking of Proposal). Carefully review the submittal requirements, as failure to submit a Proposal in the proper format and in proper number may cause that Proposal to be rejected. The selection shall follow the Texas Government Code Chapter 2269, Contracting and Delivery Procedures for Construction Projects. The firm that offers the best value to the district based on published selection criteria and on its ranking evaluation will be selected. The District shall first attempt to negotiate a contract with the selected firm. Should negotiations be unsuccessful, the firm will be notified in writing of the decision to end negotiations, and the District will proceed to the next firm in the order of selection ranking until a contract is reached or all proposals are rejected. Based upon the proposal material submitted, the following criteria will be used to evaluate firms.

Criteria Number	Criteria Description	Category Value
1	**Purchase Price**	
1a	¹ Proposal Price - This section will be scored according to published formula by Construction Services Procurement personnel and provided for all evaluators:	40 points
	Category Total:	**40 points**
2	**Reputation of Vendors and of the Vendor's Goods or Services**	
2a	References – Designated evaluators will check references to score this section:	5 points
	Category Total:	**5 Points**
3	**The Quality of the Vendor's Goods or Service**	
3a	Safety Plan, and Insurance Rate Modifier (IRM):	5 points
3b	Proposed Project Team(s) and Management approach to proposed projects:	7 Points
	Category Total:	**12 Points**
4	**The Extent to which the Goods or Services Meet the District's Needs**	
4a	General Contractor's current/past K-12 new or renovation construction experience:	10 points
4b	Proposed Construction schedule and phasing plan:	5 points
	Category Total:	**15 points**
5	**The Vendor's Past Relationship with the District**	
5a	Rated based on Past Project Performance, Quality, Compliance with Terms & Regulations.	5 points
	Category Total:	**5 points**
6	**The impact on the Ability of the District to Comply with Laws and Rules Relating to Historically Underutilized Businesses (SBE)**	
6a	Proposer demonstrated a commitment to the district's SBE program by providing enhancements to the administration of the proposer's contracting process for the work to be done by SBE firms. Examples of this commitment may include any of the following: expedited payments, Mentor Protege Programs, early release of retainage, expanding the pool of diverse subcontractors to firms that have not done business with the district, etc.	3 Points
6b	Proposer submitted a list of two (2) SBE subcontractor references.	2 Points
6c	Proposer is a certified SBE OR Proposer submitted a Joint Venture Agreement with a certified SBE OR Proposer submitted a Prime Subcontractor Teaming Agreement with a certified SBE.	5 Points
6d	Proposer submitted a diverse list of certified SBE subcontractors, sub-consultants or suppliers that meets or exceeds the district's SBE aspirational goal in meaningful and significant roles OR Proposer demonstrated outreach designed to meet the SBE project goals with a diverse SBE team of subcontractors, suppliers and subconsultants.	5 Points
6e	Proposer demonstrated a comprehensive framework and understanding of the district's SBE program by: providing a written and detailed SBE compliance plan, designating a high ranking individual who will be responsible for M/WBE contract compliance, monitoring and reporting, ensuring no unauthorized changes to SBE subcontractors, adhering to the SBE commitment and subcontractor payment terms, executing the SBE subcontracting schedule, complying with the district's SBE Program.	5 Points
	Category Total:	**20 Points**
7	**The Total Long-Term Cost to the District to Acquire the Vendor's Goods and Services**	
7a	Financial status of the vendor (as rated by Dun & Bradstreet):	3 Points
	Category Total:	**3 Points**
8	**Any other Relevant Factor Specifically Listed in the Procurement Document**	
8a	N/A	0 points
	Category Total:	**0 points**
	Total	**100 Points Maximum**

[1] Proposed Pricing Formula:

Maximum Score = Minimum Score = Zero (0)
Forty (40)
Notes: Low Bidder can only receive the full 40 points if at or under the advertised Construction Budget Estimate (A7)
Notes: Bids that are under budget will only lose 1 point per % from Low Bidder (Column G)
Notes: Bids that are over budget will be penalized 1 point per % from Low Bidder to the Budget & 2 points per % from the Budget
Notes: The low bidder is awarded points up to 20% over budget. If Low bid is 20% or more over Construction Budget Estimate (A7), no bidder shall receive any points for price.
NOTE: If all bidders are 20% or more over budget resulting no points being awarded, Dallas ISD shall use an alternative price evaluation formula to award points for the bids received. Low bidder will be awarded 5 points and each bidder will lose 1 point per percent from the low bid.
Formula = P10-G10*100 P= Max Points Allowed (40) G= % from Low Bid

Step 1- Determine Low Bidder (Column C)
Formula = =IF(Bid=$E$6,"Low Bidder","-")
E6 = Low Bid

Step 2- Calculate Bid Delta ($) from Budget (Column D)
Formula = =Bid-$A$7)
A7 = Construction Budget Estimate

Step 3- Calculate Bid Delta (%) from Budget (Column E)
Formula = =ROUND((Bid-$A$7)/$A$7,2))
A7 = Construction Budget Estimate

Step 4- Determine if Bid is Over or Under Budget (Column F)
Formula = =IF(Bid<=$A$7,"Under Budget","Over Budget"))
A7 = Construction Budget Estimate

Step 5- Calculate Bid Delta (%) from Low Bid (Column G)
Formula = =IF(C10="low bidder",0,ROUND(E10-MIN($E$10:$E$40),2)))
C10 = Low Bidder vs Not Low Bidder

Step 6- Calculate Points Lost for Bids Under Budget. (Column H)
Bid Proposals that are UNDER the Construction Budget Estimate provied will be scored with an escalator of 1. 1 Point Per Percent from low bid will be deducted from max points of 40.
Pricing Formula = =IF(C10="low bidder",0,IF(F10="under budget",ROUND((G10*100)-K10,0),IF(MIN($E$10:$E$40)>0%,0,ROUND(-MIN($E$10:$E$40)*100,0)))))
Under Budget

Step 7- Calculate Points Lost for Bids Over Budget. (Column K)
Bid Proposals that are OVER the Construction Budget Estimate provided will be scored with an escalator of 1 from the Low Bid to the Budget and an Escalator of 2 from the Budget to their bid. 1 Point Per Percent from the low bid will be deducted from low bid to budget & 2 points per percent from budget to their amount from max points of 40.
Pricing Formula = =IF(F10="under budget",0,IF(F10="OVER BUDGET",IF(C10="low bidder",ROUND((E10*100),0),ROUND((E10*100),0)))))

Step 8- Add Multiplier to Points Lost for Bids Over Budget (Column M)
Bid Proposals that are OVER the Construction Budget Estimate provided will be scored with an escalator of 1 from the Low Bid to the Budget & an Escalator or 2 from the Budget to their bid. 1 Point Per Percent from low bid will be deducted from low bid to budget & 2 points per percent from budget to their amount from max points of 40.
Pricing Formula = =IF(C10="low bidder",K10*2,IF(F10="under Budget",0,(E10*100)*2)))

Step 9- Calculate Total Points Lost (Column N)
Add Points Lost from Step 7 (Column J) + Points Lost from Step 8 (Column M)
Pricing Formula = =J10+M10)

Step 10- Calculate Total Points Awarded (Column Q)
Subtract Points Lost from Max Points of 40
Pricing Formula = =IF(C10="low bidder",K10*2,IF(F10="under Budget",0,(E10*100)*2)))
C10 = Low Bidder vs Not Low Bidder

SECTION 00 31 00 - AVAILABLE PROJECT INFORMATION

1.01 PROJECT NAME/ADDRESS

CSP 208290, consisting of improvements to:

Org #	PROJECT NAME	PROJECT TYPE	ADDRESS
023	DAVID W. CARTER HIGH SCHOOL	ADDITION AND RENOVATION	1819 W. Wheatland Road Dallas, TX 75232

1.02 OWNER

Dallas Independent School District
Construction Services
Linus D. Wright Dallas ISD Administration Building
9400 N. Central Expressway Suite 800
Dallas, TX 75231

State Notification-

- A copy of the 10-day Abatement and/or Demolition notification submitted to the State, must be forwarded to the following departments within reasonable time frame:
- Dallas ISD Environmental-DDANIELS@dallasisd.org
- Bond Safety Department – William French – C105785@dallasisd.org

Guidelines for Facility Owner Section-

- 10-day Abatement and Demolition State Notification, the below information must be included on **the facility owner section:**
- Name: Dallas Independent School District- Construction Services
- Attention: Contract Manager
- Address: 9400 N US 75-Central EXPY, STE 800 Dallas, TX 75231

1.03 OWNER'S PROJECT MANAGER (PM)

Michael Evans will be the Owner's Project Manager (PM) for the management of planning, design, permitting, construction, and post-construction for this CSP. All correspondence and communication during the contract finalization, construction and post-construction processes shall be directed to the Architect/Engineer firm (A/E) with copy to **Michael Evans.** During construction, the PM shall have authority to act on behalf of Dallas ISD for Owner related direction.

Michael Evans Project Manager
Dallas Independent School District
Construction Services
Linus D. Wright Dallas ISD Administration Building
9400 N. Central Expressway Suite 800
Dallas, TX 75231
Phone: **972-925-7534**
E-mail: **C0122495@dallasisd.org**

1.04 ARCHITECT/ENGINEER FIRM (A/E)

PBK Architects has been retained by Dallas ISD as the primary Architect/Engineer (A/E) for this bid package. All Drawings and Specifications have been prepared by the Architect/Engineer

(A/E), including those dated August 25, 2024. All correspondence and communication regarding these documents shall be directed to the Architect/Engineer (A/E) with a copy to Project Manager.

PBK Architects
14001 Dallas Parkway
Suite 400
Dallas, TX 75240
Main Contact: **Daniel Berger/Annan Wang**
Phone: **972-233-1323**
Email: **Daniel.Berger@pbk.com/Annan.Wang@pbk.com**

1.05 Summary of Work. See related Section 01 10 00 Summary of Work

1.06 Project Schedule. The Contractor shall diligently prosecute and achieve Substantial Completion of the Work no later than as shown below.

Org # -SCHOOL NAME and PROJECT TYPE	SUBSTANTIAL COMPLETION	Final COMPLETION
023 – DAVID W. CARTER HIGH SCHOOL – ADDITION AND RENOVATION	14 months after NTP	60 days after Substantial

A Notice to Proceed (NTP) will be required before any work may commence. The NTP will be issued to the contractor when signed contracts, and any other required forms required, are returned to the Owner with valid bonds and insurance

A separate contract will be issued by Dallas ISD for each school. The Contractor will be required to provide Payment and Performance Bonds for each contract. Contractor shall be responsible for all permit costs including plan review fees.

1.07 Estimated Construction Budget (including allowances). The estimated construction budget for each school and total for the package is shown in the table below. The Owner reserves the right to reject any and all proposals if they exceed the estimated construction budget amount. The total base proposal amount for the package, which includes the listed allowances, will be considered in the evaluation of the Contractor's proposal.

For accounting purposes each school construction budget stands alone. In Section 00 41 11 Proposal Form Base – Base Bid (Part 1-A of the CSP), Proposers are required to enter a cost per school breakdown of their proposed Base Bid amount including allowances so that the cost per school can be verified against the per school budget during negotiations. These breakdowns are not for evaluation purposes and will not be read at the proposal opening.

School Org #	School Name and Project Type	Construction Cost Limitation (CCL)	In Contract Owner Controlled Contingency (IC) 5% for Renovation	Total Other Owner Allowances	Estimated Construction Budget (CCL + IC + Allowances)
023	DAVID W. CARTER HIGH SCHOOL – ADDITION AND RENOVATION	$4,000,000.00	$ 200,000.00	$ 15,500.00	$4,215,500.00

1.01 **Student Safety is Priority-One**. The General Contractor ("the Contractor") has the duty of care to perform the Work safely. The Dallas ISD Safety Program and School Operational Parameters are incorporated into the Project Contract Documents. **Under the AIA 101 and 201, the Contractor's Superintendent is the person responsible for the daily safe execution of the Work.** The Contractor recognizes the critical need for the safety of all persons involved with the construction project, and most specifically the safety of students and the campus staff, and the need to conduct any and all construction operations in such a way as to NOT endanger the students and to NOT DISRUPT THE SCHOOL OPERATIONS.

The Contractor's Superintendent will plan his work with the students' safety as priority one. **On a daily basis, the Contractor will plan and execute his work (in coordination with the campus Principal, but under DISD Construction Services direction) with the utmost care to not endanger the students' safety or the schools' operations. To this end, for each active project, the Contractor's safety manager and the Contractor's job site specific safety person MUST attend each DISD monthly Safety Committee Meeting. The PMF PM will also attend.**

Daily Contractor Operations:

- Prior to the start of each work shift, daily jobsite specific Job Hazard Analysis (JHAs) will be provided by the Contractors' subs and reviewed by the Contractor.

- Prior to the end of each work shift, the Contractor's Superintendent will walk the site, and take the requisite action, to physically field verify that the campus has been made safe for student occupancy (the following morning), to protect the Work, materials and equipment from vandalism and theft. All gates and doors must be secured, and all warning signs must be posted.

- And at the end of the workday, the Contractor WILL audit the campus life safety systems and then call Central Control at 214.932.5627, to confirm to Central Control that the fire alarm system and security systems are back on normal operations.

- **The Contractor will not rely on DISD ("the Owner") staff, school personnel, or PMF PM to perform his end of shift duties of making the campus safe for occupancy and auditing the life safety systems.**

The Superintendent must have OSHA 30-Hour Training and must be proficient in enforcing the Dallas ISD Safety Program and School Operations Parameters. Each Foreman, that will be working on site, must have the OSHA 10-Hour Training.

2.01 **School Operating Hours.** For Contractor construction purposes, access to school facilities shall be limited during the school's normal working hours. During school operating hours, student occupancy and use is priority one. **And during normal hours, on a daily basis, the Contractor will plan and execute his work (in coordination with the campus Principal, but under DISD Construction Services direction) with the utmost care to not endanger the students' safety or the schools' operations.** To this end, during school operating hours, the Contractor will incorporate student safety as priority one in his daily task specific Job Hazard Analysis ("JHAs") and there will be no digging during normal school operating hours.

3.01 **Normal hours** are defined as the time and days when DISD provides for custodial staff to be on site. The cost for DISD custodial staff, during normal working hours on normal working days, shall NOT be included in the Contractor's proposal. During procurement, the Contractor is free to call the campus to inquire as to the campus normal hours of operation. The DISD School calendar is readily available on the Dallas ISD website with a listing of the campus working days.

4.01 **After Hours Access.** The campus custodian must be on site when the Contractor is working after hours. **The Contractor is responsible for all after-hours custodial costs.** This cost shall be included in the Contractors proposal price. After hours are defined as the time when DISD does not have custodial staff on site. The Contractor will incur custodial overtime costs, at the rate of $30 per hour, for DISD custodial staff presence at the school site. The Contractor will not rely on DISD

("the Owner") staff or school to perform the Contractor's housekeeping duties. Custodial staff will be on site only to allow the Contractor access to the campus. Custodial staff will not perform cleanup work for the Contractor.

The Contractor is responsible for all after-hours custodian costs on days and times including but not limited to nights, weekends, DISD non-working days, and holidays. Any request by the Contractor to enter areas of the school, after normal operating hours, shall be coordinated and approved in advance per the (5) step process outlined on the DISD **'After Hours Access Request Form'**.

The contractor shall utilize the After-Hours Access Request form and submit said form to DISD at least two (2) working days prior to the needed access date. Contractor shall submit copies of each fully executed form(s) to the Project Manager ("PMF") via email each day and during each weekly progress meetings so that they may be attached to the meeting minutes. Upon request, the PMF PM will provide the After-Hours Access Request form to the Contractor in electronic format. **After execution of the Work, the Contractor must email all custodial forms to the PMF prior to leaving the site. Noncompliance will require the Contractor to daily hand deliver (the following morning) the end of the day executed OT form to the bond office.**

5.01 **Holidays, Spring, Summer, Fall, and Winter Break Operations.** The Contractor will explicitly show each holiday, spring, summer, fall, and winter break and each SPA on his schedule. The Contractor will plan the project's construction operations to perform major portions of the Work after hours, during holidays, and at times when the campus is NOT occupied. The heating scope should be performed during the summer and the cooling scope should be performed during the heating season.

The DISD School Calendar is available on the Dallas ISD website with a listing of all the holidays and breaks. Any requirement by the Contractor to enter areas of the school during the evenings, non-working days, and holidays shall follow the (5) step process outlined on the DISD 'After Hours Custodial Request Form' and the area will be made safe for student occupancy (the following morning).

6.01 **Summer School Status**. The Contractor will plan the construction Work to perform major portions of the Work during the summer, after hours, during holidays, and at times when the campus is NOT occupied. The heating scope should be performed during the summer and the cooling scope should be performed during the heating season. The Dallas ISD School Calendar is available on the Dallas ISD website with a listing of all the holidays and breaks.

To the extent feasible, the Owner will plan NOT to have summer school at school sites affected by construction. Select campuses may have summer programs and or early school start dates. **Upon mobilization to the campus, it is the Contractor's responsibility to coordinate with the campus Principal to phase the Work in such a way as to incorporate summer programs and or early campus start dates into the project Work schedule.**

WHEN WORKERS AND DISD TEACHERS/STAFF ARE BOTH WORKING IN THE SAME AREA, THE CONTRACTOR'S SUPERINTENDENT (OR SAFETY MANAGER) WILL HAVE THE STAFF & STUDENTS SAFETY AS PRIORITY ONE. SPECIFICALLY, (2) WEEKS BEFORE THE STUDENTS RETURN FROM SUMMER BREAK, THE CONTRACTOR WILL TRANSITION FROM DAY TO NIGHT WORK. DURING THIS TWO-WEEK PERIOD, IF FOR ANY REASON THE CONTRACTOR HAS TO WORK DURING THE DAY THEN THE CONTRACTOR'S SUPERINTENDENT (OR SAFETY MANAGER) WILL WALK, MONITOR, AND COMMAND AND CONTROL HIS WORKFORCE UNDER THE EXPLICIT SCOPE OF MONITORING TO KEEPING THE STAFF/STUDENTS SAFE.

7.01 **State Testing Dates**. The Contractor will NOT be allowed to perform construction activities during critical achievement test periods. After hours work will NOT be allowed on testing days. During state testing periods, the Contractor's Superintendent will be required be on site prevent his workers from being on site during testing periods. The campus State testing dates are campus specific. **Upon mobilization to the campus, it is the Contractor's responsibility to coordinate**

with the campus Principal to inform himself of the requisite state testing days and to explicitly include said campus testing dates into the project Work schedule.

For each calendar year, Contractor shall allow for a minimum of 11 testing days for Elementary Schools, 18 testing days for Middle Schools and 23 testing days for High Schools. Actual testing days and dates may vary for each school and must be confirmed with the respective school Principal.

The System-wide Testing Schedule may be available under the School Calendar on the Dallas ISD website. The Contractor should consult this calendar to determine the number of testing days that will take place during the duration of the Project and the Contractor shall include those days in his proposal.

8.01 **The Contractor Will Not Disrupt the Campus Utilities, Critical Systems, or Critical Areas of Operation**. The Contractor has the duty of care to perform the Work safely and in a manner to NOT impact the campus Critical systems and to not disrupt school operations. The campus critical systems and areas of operation are areas/systems that are required for campus occupancy. **The campus critical systems include but are not limited to the campus air conditioning systems, the campus utilities (water, sewer, electrical, etc.), the campus life safety systems, the internet, the MDF/IDF rooms, and critical areas such as the kitchen and the campus admin areas.** Any renovation work that would require a shutdown of a critical system or impact an area of operation MUST be accomplished during after hours, weekends, non-working days, holidays, and other times when the school is not in operation. All critical system and areas of operation shutdown SPAs must be shown on the project schedule and planned for in advance so that the campus is ready for student occupancy. To this end, the Contractor must provide DISD with a written Critical System Safe Plan of Action ("Critical System SPA") notification no less than 10 calendar days in advance.

A shutdown of a critical system requires written Owner approval. **The Contractor will not impact a critical system or a critical area of operation without explicit written approval from the Owner.** To this end, the Contractor MUST provide a written Critical Systems and Areas of Operation Safe Plan of Action ("Critical System SPA") and MUST decide for temporary systems or services that are acceptable to the Owner. The Contractor must provide temporary power for the campus life safety systems. During an electrical power shutdown, the life safety and campus security systems must remain operational under temporary power. And during power shutdowns the campus food must be refrigerated under temporary power to prevent spoilage.

9.01 **10-Day Notice of Power Shutdown**. The Contractor has the duty of care to perform the Work safely and in a manner to NOT damage the Owner's equipment. **To this end, the Contractor must provide the Owner with a written proposed Power Shutdown Safe Plan of Action ("Power Shutdown SPA") no less than 10 calendar days in advance of the shutdown.** The COMPLETE proposed SPA will be transmitted via email to both the Project Management Firm PM (PMF) and the DISD Safety Manager. After review by the Owner's Safety Manager (with 10 calendar days in advance notice), the PMF PM will transmit said Power Shutdown SPA to DISD's Contract Manager, DISD Central Maintenance Office, the A/E team, and the campus custodial staff. All utilities shutdowns must be shown on the project schedule.

During electrical power shutdowns, the life safety and campus security systems must remain operational. The Contractor must provide temporary power for the campus life safety systems. And during power shutdowns the campus food must be refrigerated under temporary power to prevent spoilage.

10.01 **Worker Identity Badges**. The Contractor must provide each construction workers with a DISD approved third party issued identification badge, that shall be worn, visibly at all times while the worker is present on the campus construction site. **All workers must undergo a background check via Dallas ISD's approved third party vendor. After badging, prior to being allowed on site, each worker must attend a 2-hour DISD Safety Orientation. The Contractor is responsible for all badging and safety orientation costs.**

11.01 **Construction Fencing, Parking and Staging Areas**. Because the Work is a Phased project, the Contractor SHALL include the cost of all hard barriers and signage in his bid. The Contractor SHALL include the cost of covered walkways in his bid. The Contractor SHALL provide hard barriers and signage at his own cost. No CAEAs or additional funds will be provided to the Contractor for fencing, signage, parking, relocation of the jobsite trailer and or relocation of the staging areas.

Six-foot fencing and privacy cloth SHALL be provided to enclose the Contractor's laydown areas and job site trailer. Contractor site activities, storage offices, and fabrication shall be limited to the areas enclosed by construction fences. Contractor parking SHALL be limited to the area enclosed by the construction fence or other Owner approved areas adjacent to school property. The Contractor SHALL include the cost of offsite parking for his workers in his bid.

Because the Work is a Phased project, the Contractor shall include the cost of all required hard barriers and signage in his bid. The Contractor will incorporate all costs associated with deenergizing and or relocating hard barriers, electrical exit signs, etc. for each phase of the phased Work. The Contractor must coordinate all temporary barriers with the Fire Marshall. As the Contractor shuts down a part of the school, the Contractor SHALL erect, at his own cost, a floor to ceiling barricade to completely separate his work area from the campus occupants. The barrier shall be made of 3/4" plywood, it shall extend from floor to ceiling, wall to wall, shall have a door that can be locked, and shall be painted on the Owner's side. This barrier shall remain in place until the Work is completely finished. Safety warning signage shall be displayed near the temporary barrier. Temporary construction barriers and safety signage must be provided at tie-ins from Additions to existing structures.

12.01 **Fire Alarm System Maintenance, Operation, Removal and Certification**. Life Safety Systems are critical systems for occupancy and may only be disabled under a SPA and WRITTEN Owner approval. The Contractor shall be responsible for all costs and coordination of any disconnection, removal, shunting, reconnection, testing, and re-certification of the fire alarm and security systems as required to accomplish the Work. The Contractor is responsible for maintaining the existing fire alarm system, security system, and life safety systems operational throughout construction duration. If the Contractor requires the temporary or permanent relocation of fire alarm devices in order to complete the Work, then Contractor shall be responsible for notifying the PMF Project Manager and utilizing DISD's Vendor (if the system is under warranty) to disconnect, remove, secure, protect, reinstall, re-test and re-certify said equipment or system. If no vendor is indicated (or it is not under warranty), then the Contractor may select a qualified fire alarm vendor of his choosing. The Contractor is responsible for all costs and coordination of any disconnection, removal, shunting, reconnection, testing, and re-certification of the fire alarm system required to accomplish the Work and to receive the requisite green tag or certificates from the applicable Fire Department.

Anytime an existing fire alarm system or security system is disabled, prior to leaving the site for the day, the Contractor must contact Dallas ISD's Safety and Security Central Control at 214.932.5627. The Contractor will be required to provide his name, company, cell phone number, the reason for placing the system in trouble and how long the system will be disabled. The fire alarm and or the security system will not be left disabled overnight. **At the end of the workday, the Contractor must audit the campus life safety systems and call Central Control at 214.932.5627, to confirm that he has place the fire alarm system and security systems back on normal operations.** The Contractor will not rely on DISD ("the Owner") staff or school security personnel to perform this duty.

Contractor shall comply with the following time restrictions, when scheduling Fire Alarm inspections, and placing the life safety systems on TEST, **that require contact with DISD Central Control**. The Contractor will be responsible for any and all costs associated with said inspections (including but not limited to scheduling the Fire Marshal, City or any other personnel needed for this inspection).

- 7:00 AM - 9:00 AM (Arrival): Fire Inspections can occur before 7:00 AM or after 9:00 AM
- 2:30 PM - 4:00 PM (Dismissal): Fire Inspections can occur before 2:30 PM or after 4:00 PM

13.01 **Technology/Communications**. The Contractor has the duty of care to perform the Work in a manner to NOT damage the Owner's equipment. To this end, the Contractor must provide DISD with a written Power Shutdown Safe Plan of Action ("Power Shutdown SPA") notification of power or other utility shutdown no less than 10 calendar days in advance of the shutdown.

Contractor is responsible for any damages or changes to the existing technology/communication system throughout the duration of the construction and must make any appropriate repairs. If the Contractor requires the temporary or permanent relocation of technology in order to complete his work, then the Contractor is responsible for notifying Dallas ISD and completing all disconnections, removals, temporary facilities, security, protection, re-installation, re-testing and re-certification, etc. to maintain the system. The original warranty will need to be maintained / restored. Contractor is responsible for all costs and coordination.

14.01 **Water and Electrical Utilities.** On new construction projects, the Contractor shall provide and pay for all temporary and permanent utility services necessary for the execution and completion of the Work. On new construction projects, where new utility services are being installed, the Contractor shall establish temporary utility accounts and pay for said temporary utility costs for the duration of the project (until Substantial Completion). Utility costs paid by the Contractor after Substantial Completion shall be reimbursed by the District.

On renovation projects, the contractor is allowed to use temporary power and water from the existing school for the Work inside the building.

15.01 **Off-Limit School Areas**. The Contractor shall provide for hard barriers between his work and the campus occupants. When working in the existing building, the Contractor shall not use the school's cafeteria, telephones, restrooms, vending machines, staff parking lots or any other school facility. The Contractor shall include in his bid, the cost for temporary worker restrooms and the costs for offsite parking.

16.01 **No Overhead Lifting and No Trenching During Normal School Hours**. The Contractor shall NOT perform overhead lifting activities over areas occupied by students, school personnel, or visitors. The Contractor recognizes the critical need for the safety of all persons involved with the construction project, most specifically the students and the campus staff, and the need to conduct any and all construction operations in such a way as to NOT endanger the students and to NOT DISRUPT THE SCHOOL OPERATIONS. **Any Work that would require lifting over an occupied area or excavating MUST be accomplished during after hours, weekends, non-working days, holidays, and other times when the school is NOT in operation.** Roofing kettle operations will not be allowed to commence while the campus is occupied.

The Contractor shall NOT perform any trenching or excavating activities during regular school hours. Prior to digging, the Contractor shall perform a GPR and overlay the utilities finding over the Work areas. One week prior to any planned excavation or trenching, the Contractor shall conduct a Pre-Dig meeting (on site) with all the subs involved. Agenda will include a discussion about the GPR findings, the scope and review of the existing underground utilities as it relates to the planned trenching / excavation. At the pre-dig meeting, Contractor shall present a contingency plan if any utility is struck during execution of such work. The GPR findings overlay will be shared with all subcontractors and will be posted for worker ready reference at the jobsite trailer.

All utilities must first be hand dug, to field verify the depth and location of said line. Only after field verifying the depth and location, may the Contractor use mechanical equipment to excavate.

17.01 **Delivery of Materials and Equipment.** The Contractor shall issue a directive to all of his subcontractors that deliveries for this project shall be made to the Contractor and not to the campus office or to DISD personnel. It will be the Contractor's responsibility to replace, at his own cost, equipment or deliveries that are lost because of noncompliance with said delivery requirements.

The Contractor will also direct his subcontractors to NOT make deliveries during student arrival, student departure and on student testing days.

18.01 **Owner's Right to Salvaged Items**. Dallas ISD reserves the right to salvage any and all materials. The Contractor shall notify the Owner at least 4 weeks prior to the start of demolition (in each area where demolition will be performed). During said 4 weeks, the Owner may furnish a list of items to be salvaged, labeled, logged, and delivered to a place of DISD's choosing. Upon request, the Contractor will provide a receptacle acceptable to DISD for said salvageable items.

19.01 **Equipment Access**. During installation of new chilled water, hot water lines, new VAVs, AHUs, RTUs, Boilers, etc. the Contractor will install the new work in a way where he provides the requisite equipment access at each service side panel in accordance with the manufacturer's recommendation. The Contractor will account for insulation thickness, all existing and new above ceiling MEP and will coordinate his work prior to installation of new equipment. Please refer to the Contract Documents for specific details and preinstall meetings.

20.01 **Removal of Fixed Furnishings, Fixtures or Equipment.** The Contractor is responsible for the cost of removal, cataloguing, protection and the re-installation of fixed furnishings, fixtures or equipment required by the Contractor for the execution of his Work. The Contractor will include in his base bid, the costs to relocate and protect from damage said furniture, equipment, and property within any given room.

21.01 **Moveable Furnishings or Equipment.** This is a phased project. The Contractor will be responsible for any relocation of furniture or school property within any given room as necessary to perform the Work. The Contractor will include in his base bid, the costs to relocate and protect from damage said furniture, equipment, and property within any given room. The Contractor must obtain written approval to relocate furnishings or equipment within the room from the Owner via the PMF PM.

22.01 **I.T. Equipment and Safety/Security Equipment**. The Contractor SHALL coordinate a preinstallation meeting between DISD IT, the Contractor and the PMF PM. The Owner will be responsible for moving I.T. equipment and chemicals from science labs, when necessary. A pre-move meeting will be held at least five (5) days prior to any move requiring the Owner's involvement. If required, to accommodate significant demolition and construction activities, DISD will provide and the PMF will manage a moving services vendor to relocate movable furnishings and equipment out of each phased classroom area and into temporary facilities. The Contractor shall be responsible for coordinating the phasing of the Work with the Owner's moving vendor. Contractor will be responsible for the protection of any furnishing or equipment remaining in the Work areas.

23.01 **Tobacco and Alcohol Products Prohibited.** Use of all tobacco, alcohol and illegal uncontrolled substances is prohibited on Dallas ISD property. The Contractor will take daily action to enforce compliance.

24.01 **The Contractor Will Not Interact with Students/Campus Staff.** This is a phased project. The Contractor will install hard barriers between his Work and the campus occupants. As the Work progresses, the Contractor will move or relocate the hard barriers are required to prevent worker/student/staff interaction. The Contractor shall issue daily instructions to all of his subcontractors to refrain from interactions with students and campus staff.

25.01 **The Contractor Will Not Use Existing School Facilities.** Construction crews MUST stay away from all areas existing school facilities that are not within the limit of the designated work area. When working in the existing building, the Contractor shall not use the school's cafeteria, telephones, restrooms, vending machines, staff parking lots or any other school facility. The Contractor shall include in his bid, the cost for temporary worker restrooms and the costs for offsite parking. The Contractor shall issue instructions to all of his subcontractors to avoid interactions with students and campus staff. The Contractor will not rely on DISD ("the Owner") staff or school security personnel to perform his duties.

26.01 **Pressurized Testing.** Repressurizing of an existing system will be accomplished gradually and methodically and in a way that it does not damage the existing infrastructure. The Contractor has the duty of care to perform the Work safely and in a manner to NOT impact the campus Critical systems. Pressurized testing, on MEP systems, shall be done after hours, weekends, non-working days, holidays, and other times when the school is not in operation by Dallas ISD that occupied areas are not impacted, directly or indirectly, due to the testing.

27.01 **No Roofing Work Activities Allowed Over Occupied Areas.** On a daily basis, the Contractor will plan and execute his work with the utmost care to not endanger the students' safety or the campus operations. Activities that may cause a hazard to the below occupants is restricted. To this end, prior to the start of each work shift, daily jobsite specific Job Hazard Analysis (JHAs) will incorporate this requirement. NO roofing work or hot work is allowed, regardless of the extent, when the campus is occupied. Specifically, roof work not allowed while the campus is occupied includes, but is not limited to roof coring, roof drilling, installation of roofing electrical and plumbing pipes, no installation of roof blocking, no installation of gas lines or equipment curbs, no installation of flashing, no roof demolition activities, no placing materials on the roof, and no maintenance or warranty work that would require changing of a piece of equipment.

Minimal inspections and maintenance activity are allowed. For example, activities that would require a workman to access the roof and make minor adjustments or to change a small blower. Said activity must be coordinate in advance.

28.01 **Demolition Activities Will Be Conducted With Student Safety As Priority One.** On a daily basis, the Contractor will plan and execute his demolition work with the utmost care to not endanger the students' safety or the campus operations. Prior to the start of each work shift, daily jobsite specific Job Hazard Analysis (JHAs) will be provided, and the Asbestos report will be reviewed so as to prevent an asbestos release. And during abatement demolition and containment, the MEP chilled water lines, electrical lines, low voltage, fire suppression lines, etc. will be temporarily supported by the abatement contractor. This cost will be part of the contractor's base scope and will be included in his bid.

29.01 **Phased Project With Student Safety As Priority One.** On a daily basis, the Contractor will plan and execute his work with the utmost care to not endanger the students' safety or the campus operations. Prior to the start of each work shift, daily jobsite specific Job Hazard Analysis (JHAs) will be provided.

Since the school buildings will be in use during construction, the Work shall be conducted in phases as proposed in the Contract Documents phasing drawings. **Phasing proposed by the Contractor during procurement will be deemed proposed and not as accepted.** After the Notice to Proceed ("NTP') is issued to the Contractor, the Contractor's proposed phasing will be reviewed by the PMF Project Manager. The PMF PM will make a recommendation for DISD Contract Manager acceptance or rejection. **If proposed phasing plan is rejected by the PMF PM or DISD Contract Manager, then the phasing plan in the Contract Documents stands**.

Because the Work is a Phased project, the Contractor will include the cost of all required hard barriers and signage in his bid. The Contractor will incorporate all costs associated with demoing and or relocating hard barriers, electrical exit signs, etc. for the phased Work. The Contractor must coordinate all temporary barriers with the Fire Marshall. As the Contractor closes down a part of the school, the Contractor SHALL erect (at his own cost) a floor to ceiling barricade to completely separate his work areas from the campus occupants. Said barrier shall be made of 3/4" plywood, shall extend from floor to ceiling, shall be installed from wall to wall, shall have a door that can be locked, and shall be painted on the Owner's side. Hard barrier will remain in place and be relocated as work progresses until the Work is completely finished. The door will be kept secured to prevent students from entering construction areas.

30.01 **Project Schedule.** The Contractor will plan and execute his work with the utmost care to not endanger the students' safety or the campus operations. The Contractor will explicitly show each holiday, spring, summer, fall, winter break and each SPA on his schedule. The Contractor will plan

the construction Work to perform major work activities after hours, during holidays, and at times when the campus is NOT occupied.

Even though DISD does not operate its HVAC systems as true 4 pipe system, most DISD campuses have a 4-pipe system. Hence, the cooling scope should be performed during the heating season and the heating scope should be performed during the summer. These activities must be planned in advance and shown on the project schedule. The cooling portion of the work that is performed during the summer break must be fully operational by the time the teachers return from their summer break. The heating work that is performed during the winter holidays must be fully operational by the time the students return.

The Project Schedule must show that during the summer break, 2 weeks prior to students' arrival, the contractor will shift to working nights, weekends, DISD non-working days, and holidays. 2 weeks prior to students arrival, the teachers will occupy the campus during the day to prepare their classrooms for student use.

The Contractor must plan in advance and show on the project schedule all Dallas ISD Safety Manual high risk SPAs including but not limited to Pre Crane, Pre-Dig, Pre-Crawlspace, Pre-Dig, and Pre-Utility SPAs.

31.01 **Weekly Owner, Architect, Contractor ("OAC Meetings").** The Contractor's Project Manager and Superintendent MUST attend all weekly OACs. Missing more than 2 OACs will be grounds for replacing the Contractor's Project Manager and or Superintendent.

On a weekly basis the Contractor will organize and host an Owner, Architect, and Contractor ("OAC") progress meeting. At said meeting the Contractor will provide all attendees a hard copy of the project schedule, a copy of the 3 week look ahead, the RFI Log, the ASI Log, the PCO Log, the Submittals Log, and a hard copy of the Equipment Long Lead Items List. After the OAC meeting, the Owner, Architect, and the Contractor will walk the site to review installed work.

32.01 **DISD Monthly Safety Meeting.** For each active project (that has not reached Substantial Completion), the Contractor's Safety Manager and the Contractor's job site Superintendent MUST attend each DISD monthly Safety Committee Meeting. Noncompliance with said requirement will be grounds for replacing the Contractor's Safety Manager and or Contractor's Site Safety Person.

33.01 **Inclement Weather SPAs.** The Contractor will comply with DISD Inclement Weather SPA reporting requirements. The Contractor's Project Manager and Superintendent on a daily basis will monitor the weather to mitigate the damage to DISD property. The Contractor will take proactive action to prevent water intrusion. When HVAC or roofing work is in progress, the Contractor will temp in his Work to prevent water intrusion.

34.01 **Jobsite Trailer Postings.** On a weekly basis, the Contractor will plan and execute his work with the utmost care to not endanger the students' safety and to provide his subcontractors the most up to date project information available. To this end, the below items will be posted immediately adjacent to the job trailer entrance:

- The Project Team's Contact List w/Phone Numbers and Email.
- A Complete Copy of the Operations Parameters.
- A Colored Copy of The Most Recent GPR Report.
- A Site Map Showing the Location of each Utility Shutdown Valve.
- A Copy of the Project Baseline Schedule
- A Copy of the 3 Week Lookahead Schedule.
- A Copy of the Project's Phasing Plan.
- A hard copy of the last OAC Hand Outs.

On a daily basis, the Contractor will plan and execute his work (in coordination with the campus Principal, but under DISD Construction Services direction) with the utmost care to not endanger the students' safety or the campus operations.

Prior to the start of each work shift, daily jobsite specific Job Hazard Analysis (JHAs) will be provided. And, prior to the end of each work shift, the Contractor's Superintendent will walk the site, and take the requisite action, to make the campus safe for student occupancy (the following day), to protect the Work, materials and equipment from vandalism and theft. And at the end of the workday, the Contractor's Superintend will check all the life safety systems and then call Central Control at 214.932.5627, to confirm that the fire alarm and security systems are operational. The Contractor will not rely on DISD ("the Owner") staff or school security personnel to perform his duties.

35.01 **Lessons Learned.** For each active project, the Contractor must incorporate the below lessons learned into the planning and execution of the Work.

1) This is a phased project. The roof, windows, floors, and ceiling demolition and abatement scope will be phased by wing. Demo of the entire campus roof, windows, floors, and ceiling demolition and abatement scope will NOT be allowed at once.

2) The Contractor's Superintendent will plan his work with the students' safety as priority one. If the work endangers campus operations, it must be performed after hours, on weekends, holidays or times when the campus is not occupied.

3) **During the Summer Break, the Contractor PM and Superintendent are not allowed to take vacation. Noncompliance with said requirement will be grounds for replacing the PM and or Superintendent.**

4) All long lead item submittals must be driven to conclusion within 90 days of the Notice to Proceed. The project submittals must be driven to conclusion within 120 days of the notice to proceed.

5) Immediately after mobilizing, the Contractor will audit all of the school's life safety systems (Fire Alarm and Security Panels) and the Contractor will provide DISD will a video of any deficiencies. It will be assumed that all the systems are in perfect condition if the Contractor does not provide said video within 30 days from mobilization. At this point the Contractor will be responsible for any and all costs to repair the life safety systems.

6) For new building additions and or new building construction work any utilities work that would require a shutdown of a critical system or impact an area of operation MUST be accomplished after hours, weekends, non-working days, holidays and other times when the school is not in operation. All utilities must first be hand dug, to field verify the depth and location of said line. Only after field verifying the depth and location, may the Contractor use mechanical equipment to excavate.

7) Jurisdictional inspections shall be coordinated with the campus to not impact campus operations. The Contractor is required to include the costs of all inspection whether during normal of after-hours in his bid.

REIMBURSABLE **Fund Code:** ____

Dallas Independent School District
Construction Services
After Hours-Work, Holidays and/or Holidays Authorization Form: General Contractor(s)

SECTION A. GENERAL INFORMATION

Contract P.O.#: _____ TEA/ORG. #:_____ School Name:_____

Contractor Name: _____ Contractor Person In-Charge: _____

Scope: _____

Name of Dallas ISD Operations Employee: _____ Biometric Code:_____
Cellular Number for Dallas ISD Operations Employee_____

SECTION B. PRE-WORK NOTIFICATION:

Date of **Scheduled** Work: _____Hours of **Scheduled** Work: _____

Time **Scheduled** From _____ To _____

Contractor Person-In-Charge Signature: _____ **Date:** _____

Dallas ISD Program Administrator Approval : _____ **Date:** _____

SECTION C. POST-WORK CERTIFICATION:

Date of **Actual** Work _____

Time **Actually** worked From _____ To _____ Biometric Clock Used – Check 'X' if Yes
If Not Used – See Step 3 below

Hours of **Actual** Work _____

Contractor Person-In-Charge Signature: _____ **Date:** _____

Dallas ISD Operations Employee Signature: _____ **Date:** _____

PROCESS FOR PRE-WORK NOTIFICATION AND POST-WORK CERTIFICATION:

Step 1. At least two (2) working days prior to scheduled access, Contractor shall fill out Sections A & B, sign Section B, and email the form to Program Management Firm who will obtain Dallas ISD Program Administrator Approval. Contractor will be provided name of the Operations employee by the Program Management Firm.

Step 2. Contractor and Operations employee from Dallas ISD will meet at main entry of building at the scheduled start time.
- Contractor must notify Program Management Firm within 24 hours or pre-arranged date if contractor is unable to work.
- In case of work being cancelled for some reason, Contractor shall fill out the actual hours in Section C as "0" and email the form to the Program Management Firm.

Step 3. Upon completion of the scheduled day(s)'s work, Contractor shall complete Section C on the same form; Contractor and the Operations employee shall sign Section C; and Contractor shall send the completed form, no later than one (1) business day after execution of work, (all sections completed and signed off) to Program Management Firm. Please use a cover sheet for this step, which shows your name and contact number.
- Section C – Contractor to verify with Operations employee if Biometric Clock was used. If not used, Operations employee must complete and provide District's Non-Exempt Attendance Report with an explanation why Biometric Clock was not used.

Step 4. Contractor shall submit copies of completed and fully executed form(s) for a given month, with the respective application for payment on a monthly basis.

Step 5. **Dallas ISD shall make payment to the Operations employee(s)** based on the standard compensation procedures for Dallas ISD in accordance with the "Fair Labor Standards" Act. **Final Payment to the Contractor will be reduced by the reimbursement amount.**

Failure to follow all these steps listed above will result in:

- **Pre-Work Notification**: If the Contractor does not obtain the Dallas ISD Program Administrator approval at least two (2) working days prior to the requested scheduled access, overtime will not be worked for the day or days expected.
- **Post-Work Notification:** After the work has been completed the signed off form must be submitted the next day. If the completed form is not submitted timely the District may consider the removal of the Contractor's Person-In-Charge from the project.
- Failure to comply with the District's requirements may have a negative impact on the Contractor's ability to be assigned future work for the District.

Dallas Independent School District
Bond Program
Scheduled Utility Shutdown Authorization Form: General Contractor(s)

SECTION A. GENERAL INFORMATION: ☐ ***Permanent** ☐ **Temporary**

School Name and Org. #: _____

Bond Program Manager (PM) Name: _____

General Contractor (GC) Person In-Charge: _____ _____

Sub-Contractor (SUB) Person In-Charge: (Name) _____ (Contact No.) _____

SECTION B. PRE-WORK NOTIFICATION:

Utility System(s) to Be Shut down: _____

Utility Meter number _____

Description of Work Performed: _____

Describe Procedure for Shutdown: _____

Safety Measures/ Precautions for Shutdown: _____

Date/ Time **Requested** for Shutdown: _____ Shutdown Date _____ Shutdown Time _____ Restart Date _____ Restart Time

It is requested that the noted** building system(s) be allowed for "shutdown" **by the General Contractor to allow for our tie-in of services for the Project as enumerated below. We note that** five (5) days advance notice **is required as a minimum. I hereby certify that the required work has been coordinated and scheduled to achieve completion within the requested time-period.

SUB Person-In-Charge: _____ **(Sign)** _____ **(Date)**

GC Person-In-Charge: _____ (Sign) _____ (Date)

Bond Program Manager (PM) Approval: _____ (Sign) _____ (Date)

DISD Project Manager Approval: _____ (Sign) _____ (Date)

SECTION C. POST-WORK CERTIFICATION:

Actual Date/ Time for Shutdown: _____ Shutdown Date _____ Shutdown Time _____ Restart Date _____ Restart Time

GC Person-In-Charge Certification: _____ (Sign) _____ (Date)

Bond Program Manager (PM) Certification: _____ (Sign) _____ (Date)

DISD Project Manager Certification: _____ (Sign) _____ (Date)

(Sign)

DISD Sustainability Certification: _____ _____

SECTION D. PROCESS FOR SCHEDULED UTILITY SHUTDOWN AUTHORIZATION

A. The General Contractor is to complete the *Utility Shutdown Request Form*, at least **5 working days** prior to the scheduled utility shutdown, and submit it to the respective Bond Program Manager for approval.

B. The Bond Program Manager (PM) will review and approve submitted *Utility Shutdown Request Form* and forward to the respective Dallas ISD Project Manager for approval.

C. The Dallas ISD Project Manager will review and approve form and return to the PM.

D. PM forwards approved form to Director/Maintenance Solutions and notifies Deputy Chief Director, Emergency Operations and Bond Program Safety Manager.

Note: All scheduled shutdown requests will require a jobsite meeting with the Program Manager and the School staff 48 hours in advance to discuss the outage procedures and status of all District departments involved on the shutdown request.

Note: For electrical shutdowns (Scheduled/ involuntary), when required for building operations, the General contractor must supply a power generator to keep the telephones, data and alarms working at all times.

***Permanent shutdowns are facilities or specific meters that will not require power/ utility to be restored.**

SECTION 00 41 10 – OVERALL PROPOSAL PACKAGING CHECKLIST

1.01 Proposers are to package all submittal information as follows. Documents should be bound in 3 ring binders with tabs for each section of the proposal form. Do not spiral or GBC bind the documents.

2.01 Both Parts of the Proposal response shall be labeled as follows:

Proposal for CSP 208290
ORG 023 – DAVID W. CARTER HIGH SCHOOL

Due Tuesday, February 03, 2026
Time Due: 2:00pm
Part 1-A, 1-B, 1-C
<<Name of Proposer>>

Please Note: Part 1-C Proposal Form- Alternates & Unit Pricing (Section Div 00 41 12) - Should the solicitation contain an opportunity for alternate pricing, please ensure that the Section Part 1-C Proposal Form – Alternates & Unit Pricing Section 00 41 12 is submitted in an individually sealed envelope labeled accordingly with the specified CSP number, CSP title and Part 1-C Proposal Form – Alternates & Unit Pricing. ***Alternates Pricing will not be opened by the District unless the District engages in negotiations with the vendor submitting the alternate pricing package.***

Due: Wednesday, February 04, 2026
Time Due: 3:00pm
Part 2
<<Name of Proposer>>

Proposals will be read at 3:30pm following the receipt of Part 2

3.01 Part 1-A of the Proposal shall contain completed Specification Sections
00 41 11 Proposal Form – Base Bid (with all addenda acknowledged)
00 43 13 Proposal Guarantee Bond Form
00 45 00 Dallas Independent School District Required Forms Package
00 45 20 Certificate of Non-Discrimination
00 45 22 Notification of Hazardous Materials Affidavit Form
00 45 23 Family Conflict of Interest Questionnaire (CIQ)
Submit one (1) original of each Section for Part 1-A.

4.01 Part 1-B of the Proposal shall contain completed Specification Section
00 41 13 Technical Proposal Form
Submit one (1) original, and one (1) copy of each Section for Part 1-B and one (1) soft copy (electronic) via flash drive or USB of each Section for Part 1-B, Section 00 41 13 Technical Proposal Form section.

5.01 Part 1-C of the Proposal shall contain completed Specification Sections
00 41 12 Proposal Form – Alternates and Unit Pricing
Submit one (1) original of each Section for Part 1-C in a separate, sealed envelope marked according to the specifics noted in Section 2.01 on this page.

6.01 Part 2 of the Proposal shall contain completed Specification Sections
00 45 39 SBE Compliance Guidelines and Forms
Submit one (1) original, one (1) copy, and one (1) soft copy (electronic) in either CD Rom or flash drive of each Section for Part 2.

DALLAS INDEPENDENT SCHOOL DISTRICT

Materials Escalation Price Reconciliation Form

The intent of this document is to establish guidelines to reasonably reconcile ONLY the Project's materials cost escalation. No overhead, profit, or insurance costs are to be included. The Contractor has a duty to mitigate Materials Cost Escalation. Therefore, as a condition precedent to any cost adjustments, the Contractor must comply with establishing the Project Baseline Schedule as required under Division 1 of the Project's Contract Documents. All terms shall have the same meaning as defined in the executed AIA Agreement for this project.

1. **DELIVERY METHODS:**
   - Competitively Sealed Proposal (CSP)
   - Construction Manager at Risk (CMAR, CMaR, CM@Risk)

2. **PARTIES**
   - DISD (Owner)
   - Program Management Firm (PMF, Program Manager, PM)
   - Architect or Engineer of Record (A/E)
   - Contractor (GC)

3. **PROJECT**
   a. ORG# _____ PROJECT NAME: _____

   b. Notice to Proceed (NTP) Date: _____

   c. Date City Permits Ready for GC Pick Up: _____

   d. Date of Escalation of Materials Document Submission to Owner: _____

4. **PRICE IMPACTED MATERIALS:** It is understood that vendors providing materials to the Owner's Project may be experiencing industry-wide economic fluctuations that affect the price, availability, delivery, and execution of the Project. The intent of this document is to reasonably reconcile ONLY the Project's materials cost escalation. This form will be used by the Owner to provide a good-faith adjustment of market price-impacted materials.

5. **PROJECT BASELINE:** Compliance with establishing the project baseline will be a condition precedent to requesting Owner approval of a materials cost escalation. The Contract Documents (Drawings, Specs, and Contract) establish the elements required to establish the project baseline. The Contractor has a duty to mitigate Materials Cost Escalation.

6. **PRICE INCREASE:** In the event of a Materials' Price INCREASE, the Contract Price shall be reasonably adjusted to reconcile the Materials' Price INCREASE.

DALLAS INDEPENDENT SCHOOL DISTRICT

Materials Escalation Price Reconciliation Form

7. **PRICE DECREASE:** In the event of a Materials Price DECREASE, the Contract Price shall be reasonably adjusted to reconcile the Materials' Price DECREASE.

8. **LIMITATION ON CONTRACT PRICE ADJUSTMENT:** Regardless of Proposed Materials' Price Increases or Decreases, the Contract Price shall not be adjusted by more than 15% of the original Contract Price or any other restrictions on cost increases found in State law or the terms of the contract between Owner and Contractor.

9. **NO ADJUSTMENT FOR MATERIALS QUANTITIES:** No adjustments will be made for changes in materials quantities. The intent of this document is to reconcile ONLY materials costs.

10. **SCHEDULE OF VALUES & PAYMENT:** Payment for adjustments will be in accordance with the executed AIA Agreement, change orders, or CAEAs for this project. Similar to other Owner Cost/Credits, in accordance with Division 1 of the Specifications, the cost or the credit for materials reconciliation will be shown as a line item in the Project's Pay Application's Schedule of Values.

_____

OWNER (DISD)

_____

CONTRACTOR (GC)

_____

ARCHITECT (A/E)

DALLAS INDEPENDENT SCHOOL DISTRICT

Materials Escalation Price Reconciliation Form

EXHIBIT "MATERIALS ESCALATION" – BASELINE PRICE Matrix

The intent of this document is to establish a Baseline so that the materials escalation costs may be subsequently reconciled. To establish an objective cost baseline, the Contractor must provide the Owner a date stamped copy of the actual materials costs proposal from the materials vendor/manufacturer.

1. Price Impacted Material: _____

   Date of Price: _____

   Baseline Price: _____ (Unit)

   Pricing Method: _____

   Provide a Copy of Manufacturer Docs:

2. Price Impacted Material: _____

   Baseline Price: _____ (Unit)

   Pricing Method: _____

   Provide Copy of Manufacturer Docs:

3. Price Impacted Material: _____

   Baseline Price: _____ (Unit)

   Pricing Method: _____

   Provide Copy of Manufacturer Docs:

4. Price Impacted Material: _____

   Baseline Price: _____ (Unit)

   Pricing Method: _____

   Provide Copy of Manufacturer Docs:

5. Price Impacted Material: _____

   Baseline Price: _____ (Unit)

   Pricing Method: _____

   Provide Copy of Manufacturer Docs:

DALLAS INDEPENDENT SCHOOL DISTRICT

Materials Escalation Price Reconciliation Form

6. Price Impacted Material: _____

   Baseline Price: _____ (Unit)

   Pricing Method: _____

   Provide Copy of Manufacturer Docs:

7. Price Impacted Material: _____

   Baseline Price: _____ (Unit)

   Pricing Method: _____

   Provide Copy of Manufacturer Docs:

8. Price Impacted Material: _____

   Baseline Price: _____ (Unit)

   Pricing Method: _____

   Provide Copy of Manufacturer Docs:

9. Price Impacted Material: _____

   Baseline Price: _____ (Unit)

   Pricing Method: _____

   Provide Copy of Manufacturer Docs:

10. Price Impacted Material: _____

    Baseline Price: _____ (Unit)

    Pricing Method: _____

    Provide Copy of Manufacturer Docs:

11. Price Impacted Material: _____

    Baseline Price: _____ (Unit)

    Pricing Method: _____

    Provide Copy of Manufacturer Docs:

DALLAS INDEPENDENT SCHOOL DISTRICT

Materials Escalation Price Reconciliation Form

12. Price Impacted Material: _____

    Baseline Price: _____ (Unit)

    Pricing Method: _____

    Provide Copy of Manufacturer Docs:

13. Price Impacted Material: _____

    Baseline Price: _____ (Unit)

    Pricing Method: _____

    Provide Copy of Manufacturer Docs:

14. Price Impacted Material: _____

    Baseline Price: _____ (Unit)

    Pricing Method: _____

    Provide Copy of Manufacturer Docs:

15. Price Impacted Material: _____

    Baseline Price: _____ (Unit)

    Pricing Method: _____

    Provide Copy of Manufacturer Docs:

16. Price Impacted Material: _____

    Baseline Price: _____ (Unit)

    Pricing Method: _____

    Provide Copy of Manufacturer Docs:

17. Price Impacted Material: _____

    Baseline Price: _____ (Unit)

    Pricing Method: _____

    Provide Copy of Manufacturer Docs:

SECTION 00 41 11 – PROPOSAL FORM – BASE PROPOSAL

Name of Contractor	

COMPETITIVE SEALED PROPOSAL (Part 1A)
to
DALLAS INDEPENDENT SCHOOL DISTRICT
FOR THE FOLLOWING WORK:

PART 1. General Information

Competitive Sealed Proposal (CSP) 208290, consisting of improvements to:

ORG #	PROJECT NAME	PROJECT TYPE	ADDRESS
023	DAVID W. CARTER HIGH SCHOOL	ADDITION AND RENOVATION	1819 W. Wheatland Road Dallas, TX 75232

PART 2. Proposal Form

2.01 Agreement of Proposal Submittal

The undersigned, as a designated representative of the proposer, declares such firm is the only entity, as principal, with any interest in this Proposal, and the Proposal is made without collusion with any other entity.

The proposer affirms that the form of Contract, Instructions for Competitive Sealed Proposals, Supplemental Instructions for Competitive Sealed Proposal, Addenda, selection criteria, weighting/scoring system, estimated budget, Specifications, and the Drawings pertaining to this Proposal have been examined and the firm has also examined the locations, conditions, and classes of materials for the proposed Work and agrees to provide all necessary labor, materials, plant and equipment, machinery, tools, apparatus and construction means to accomplish the Work described in the Contract Documents in the manner prescribed.

The proposer agrees the quantities of Work to be performed and materials to be furnished may be increased or decreased as may be considered necessary, in the sole opinion of Dallas ISD's designated representative, to complete the Work as planned and contemplated. Adjustment for changes in Work will be in accordance with the General Conditions.

Proposal amounts must be shown in both words and figures. In case of discrepancy, the amount shown in words will govern.

2.02 Addenda

The proposer acknowledges receipt and incorporation of the following addenda into this Proposal. Proposer is to fill in the Addenda # and date and initial in the box to show receipt.

CSP 208290

Addendum No.	Addendum No.	Addendum No.	Addendum No.

Name of Contractor	

2.03 Withdrawal of Proposals

A Proposal may be withdrawn only upon written request by the proposer or his duly authorized representative, provided such request is received by the Owner at the place designated for receipt of Proposals and prior to the time fixed for the opening of Proposals.

No Proposal may be withdrawn after the time fixed for the opening of Proposals for a period of 90 days.

2.04 Award of Contract

The proposer to whom the award of a Contract is made will be promptly notified following Board action. If a proposer, (a) withdraws his Proposal within 90 days after the date and time fixed for the opening of Proposals in the Advertisement for Proposals, or, (b) fails or refuses to execute the Agreement, or other required forms within ten (10) days after the same are presented to him for signature, or (c) fails or refuses to furnish properly executed Performance and Payment Bonds, and certification of required insurance upon the execution of the Agreement, the Owner may award the Work to another proposer or may re-solicit the contract. The Proposal Bond is forfeited if Proposal is withdrawn after the Proposal opening, or Contract Documents are not executed in accordance with the above requirements.

The Owner reserves the right to reject any or all Proposals and to waive any irregularities in any Proposal received. The Owner further reserves the right to limit the number of contracts awarded and/or to be performed concurrently to any one Contractor if such appears to be in the best interest of the District. Awards will be per published criteria and weights. Price is only 40% of the evaluation criteria, and awards may be made to other than the low dollar proposer.

2.05 Notice To Proceed (NTP) and Notice of Intent to Award (NIA)

The Contractor shall not commence the Work under this Contract until execution of the Notice to Proceed (NTP) duly signed by Dallas ISD's designated representative.

The Contractor shall acknowledge that a Notice of Intent to Award (NIA) may be issued at the Owner's discretion. The purpose of the NIA is to expedite pre-construction activities. Upon receipt of the duly signed NIA, the Contractor shall promptly proceed with the activities listed and authorized by the NIA.

2.06 Collusion, Litigation, Default, Competency

By completing and submitting a Proposal, the proposer agrees to comply with the requirements of the following paragraph. A proposer who subsequently does not agree to comply with these requirements may be disqualified. The responses to the items of the Contractor's Qualification Statement will be used in evaluation of the Proposals on the project.

Proposers may be disqualified, and their proposals not considered for any of the following specific reasons:

1. Reason for believing collusion exists among proposers.
2. Reasonable grounds for believing that any proposer is interested in more than one proposal for the work contemplated.
3. The proposer is involved in any litigation against the Board.
4. The proposer is in arrears on any existing contract with Dallas ISD or has defaulted on a previous contract with Dallas ISD.

Name of Contractor	

5. Lack of competency as revealed by the financial statement, experience and equipment questionnaires, or omission of required proposal submittals.
6. Uncompleted work which, in the judgment of the Board, will prevent or hinder the prompt completion of this Work, if awarded.
7. Inaccurate information or circumstances that establish reasonable grounds for belief that the proposer is not a "responsible proposer" include, but are not limited to the below examples:
    a. Incomplete Bid Submittal – e.g., Missing Base Bid proposal number.
    b. Incorrectly Calculated Total Base Bid - Proposal plus Owner's Controlled Contingency MUST add up to Total Base Bid. Please double check to confirm compliance.

By entering into a contract with Dallas ISD, the proposer agrees that (1) Work on the project will begin upon receipt of the Notice to Proceed, (2) Contractor will participate as a team member in cooperation with the Architect/Engineer (A/E) and Owner, (3) The Work will not interfere with normal instructional and learning programs of the school, (4) The Contractor will assign a full time competent superintendent for each school in the CSP and that same superintendent(s) shall remain for the duration of the contract, contingent upon that person's continued employment with the Contractor, (5)The Contractor will furnish and pay for the Bid, Performance, and Payment Bonds.

- Projects of $25,000 and under: Bid bond is required
- Projects over $25,000 and up to and including $100,000: Bid and Payment Bond is required
- Projects over $100,000: Bid, Performance and Payment Bonds are required

2.07 Ultimate Corporate Ownership

Is proposer a corporation? Check One, Yes ____ No____

Proposer's legal name and address of principal place of business:

_____

_____

Ultimate parent company or majority owner's name and address of principal place of business:

_____

_____

Name of Contractor	

2.08 Contractor's Price (40 Points out of 100 Possible Points in the Selective Criteria)

The Proposer's Price is defined as the total amount, including Cost of the Work and allowances, for the performing or causing to be performed all Work including labor and materials, necessary to build, construct, erect and equip in accordance with the Contract Documents, Drawings, and Specifications.

Contractor agrees to base its price on the proposed completion schedule and the phasing plan presented in the contract documents. The Contractor may, at their option, propose a project duration that is of less duration and indicate this duration in the box below (See **Proposer's Proposed Substantial Completion Date** box below). However, the duration proposed by the Contractor must be based upon the number of phases identified in the contract documents and must not be predicated upon the use of additional temporary swing space other than the swing space identified in the contract documents. Contract documents identify the number of existing classrooms or temporary portable buildings available to the contractor for swing space.

Base proposal is defined as the Cost of the Work not including allowances or alternates.

(Amount shall be shown in both words and numbers; in the event of discrepancies, the words will govern.)

A	**Proposer's Price for all schools in CSP 208290, which includes the Allowances as per item 2.09 below:** _____ **Dollars**	**$**_____

Proposer's Price Breakdown (to be completed by proposer):

Base Proposal minus Allowances:	**$**
2.09 B: Owner Controlled Contingency Allowance (5% of Base Price minus Allowances):	**$ 200,000.00**
2.09 C: Other Owner Allowances (provided by Owner, see 2.09 C below):	**$ 15,500.00**
2.09 D: Proposer's Abatement Cost included in 2.08 A (Abatement is to be included in GC Base scope price. The intent of this section is to show the breakout of the abatement cost.)	
2.08 A: Proposer's Base Price plus (+) Allowances (should equal amount in Section 2.08 A above):	**$**

2.09 Allowance Items

The following allowances are further described in Specification Section 01 21 00.

Name of Contractor	

B	Allowance Description: In Contract Owner Controlled Contingency (IC)	Dollar Amount ($) *Proposer to Fill In (5%)
023	**DAVID W. CARTER HIGH SCHOOL – ADDITION AND RENOVATION**	**$200,000.00**

C	Allowance Description: In Contract Owner Controlled Allowances	
023	1. Interior Barrier Graphics 2. Exterior Construction Screening Graphics	1. $ 7,500.00 2. $ 8,000.00

2.10 Alternates

This information is to be submitted with section 00 41 12 (Part 1-C of the CSP Package.)

2.11 Unit Pricing

This information is to be submitted with section 00 41 12 (Part 1-C of the CSP Package.)

2.12 Breakout or Separate Pricing

The successful Proposer shall provide a proposed preliminary schedule of values for each school within the CSP 3 days after Board award. In the chart below, the Proposer must provide the cost breakdown per school of the base price provided by the Proposer in paragraph 2.08A of this section

The following information is requested for information and budget verification only and it is not the basis for the quantitative evaluation of this proposal.

School Org #	School Name and Project Type	Estimated Construction Budget	Proposer's Base Bid Proposal Breakdown per School
023	DAVID W. CARTER HIGH SCHOOL – ADDITION AND RENOVATION	$ 4,215,500.00	
NOTE: If a project has more than one school, then the proposal MUST be itemized by campus. An Addition/Renovation project MUST have 2 lines (one line for the addition and one line for the renovation scope). The Total Project bid must add up to the sum of all the itemized components.			

Org #	School Name	Owner's Expected Substantial Completion Date	Proposer's Proposed Substantial Completion Date
023	**DAVID W. CARTER HIGH SCHOOL – ADDITION AND RENOVATION**	14 Months after NTP	

Name of Contractor	

2.13 Liquidated Damages

Time is of the essence in all Phases of the Work. It is specifically understood and agreed by and between Dallas ISD and Contractor that time is of the essence in the substantial completion of the Project.

The Contractor acknowledges and recognizes that Dallas ISD is entitled to full and beneficial occupancy and use of the completed work immediately following expiration of the Contract time. The Contractor further acknowledges and agrees that, if the Contractor fails to substantially, or cause the Substantial Completion of any portion of the Work within the Contract Time, the Owner will sustain actual damages as a result of such failure. The exact amount of such damages will be difficult to ascertain. Therefore, Dallas ISD and Contractor agree that, if the Contractor shall neglect, fail, or refuse to achieve substantial completion of the Work by the Substantial Completion date, subject to any proper extension granted by Dallas ISD, then Contractor agrees to pay to Dallas ISD the following sum(s) for each day in which such Work is not substantially completed, not as a penalty, but as liquidated damages, for the damages ("Liquidated Damages") that would be suffered by Dallas ISD as a result of delay for each and every calendar day that the Contractor shall have failed to have substantially completed the Work as required herein.

	Liquidated Damages	*** Dollars Per Calendar Day**		
		Addition	**Renovation**	**New**
023	**DAVID W. CARTER HIGH SCHOOL**	0.025% of Construction Budget	0.025% of Construction Budget	0.025% of Construction Budget

*** The Dallas ISD's liquidated damages cost formula is 0.025% of the construction budget for the project, up to a maximum of $1,500.00 per calendar day.**

Name of Contractor	

PART 3. Execution

3.01 Proposal Form Execution

Contractor's Firm Name (legal name)	
Federal Tax I. D. Number	
Contractor's Street Address	
Contractor's Phone Number	
Contractor's Fax Number	
Contractor's Email Address	

SUBMITTED BY:

(Corporation, Partnership, Individual, etc.)

Name of President of Corporation *or*
Name of Principal Owner

Name of Secretary of Corporation
(if applicable)

(Corporation, Partnership, etc.,) is organized under the laws of the State of _____.

Firm: _____

By: _____
Printed Name

Title: _____

Signature: _____

Legal Address: _____

_____

Date: _____
Affix Corporation Seal here (if applicable)

SECTION 00 41 12 – PROPOSAL FORM – ALTERNATES AND UNIT PRICING

Name of Contractor	

COMPETITIVE SEALED PROPOSAL (Part 1C)
to
DALLAS INDEPENDENT SCHOOL DISTRICT
FOR THE FOLLOWING WORK:

PART 1. General Information

CSP PACKAGE 208290, consisting of improvements to:

Org #	PROJECT NAME	PROJECT TYPE	ADDRESS
023	DAVID W. CARTER HIGH SCHOOL	ADDITION AND RENOVATION	1819 W. Wheatland Road Dallas, TX 75232

PART 2. Proposal Form

2.01 through 2.09

Refer to Specification Section 00 41 11.

2.10 Alternate Price Items

The Contractor proposes the following sums as **additions to** or **deductions from** the Base Price amount for alternates. Failure to quote every item may cause the entire Proposal to be considered non-responsive. If there is no cost change in the alternate(s) pricing, the Contractor should enter "$0.00" as the price for the alternate. Do not make an entry of N/A.
All Alternates must be priced. Alternates are not listed in the order of preference.

ORG 023 – DAVID W. CARTER HIGH SCHOOL

No.	Alternate Description	Proposer's Add Price	Proposer's Deduct Price
N/A	N/A	N/A	N/A

2.11 Unit Prices

The Contractor proposes the following all-inclusive unit prices for the items/tasks. Failure to provide unit pricing for each item may result in the Proposal being deemed as non-responsive. Do not make an entry of N/A. All unit prices must be priced. Unit prices are not listed in order of preference.

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No.	Unit Price Item	Unit of measure	Proposer's Unit Price
N/A	N/A	N/A	N/A

2.12 through 2.14

Refer to Specification Section 00 41 11.

Name of Contractor	

PART 3. Execution

3.01 Proposal Form Execution (Part 1A)

Contractor's Firm Name (legal name)	
Federal Tax I. D. Number	
Contractor's Street Address	
Contractor's Phone Number	
Contractor's Fax Number	
Contractor's Email Address	

SUBMITTED BY:

(Corporation, Partnership, Individual, etc.)

Name of President of Corporation *or*
Name of Principal Owner

Name of Secretary of Corporation
(if applicable)

(Corporation, Partnership, etc.,) is organized under the laws of the State of _____.

Firm: _____

By: _____

Title: _____

Legal Address: _____

_____

Date: _____
Affix Corporation Seal here (if applicable)

SECTION 00 41 13 – TECHNICAL PROPOSAL FORM

Name of Contractor	

COMPETITIVE SEALED PROPOSAL (Part 1-B)
to
DALLAS INDEPENDENT SCHOOL DISTRICT

PART 1. GENERAL

1.01 Contractor Firm Information

Contractor's Firm Name (Legal Name)	
Contractor's Point of Contact with Signature Authority	
Street Address	
Phone Number	
Point of Contact Email Address	
Type of Business: _____ Corporation, _____ Partnership, _____ Sole proprietorship, _____ Joint Venture	
State of Incorporation	
In continuous business since (Date of Incorporation/ Years in Business):	
List other fully staffed offices or fully staffed branch offices of your organization: Name Branch Manager Telephone Number	
Corporate Officers, Partners, or Owners of Organization: Name Title Construction Experience (Years)	
Check box(es) corresponding to the nature of your business: ___Large Business (100 or more employees) ____Small Business (fewer than 100 employees) ___Minority Owned Business; Certified with _____ ___Women Owned Business; Certified with _____ ___Other (Define) _____	
Has your organization ever defaulted or failed to complete any work awarded? _____Yes _____ No If yes, stipulate where and why:	
Has your organization ever paid liquidated damages or a penalty for failure to complete a contract on time? ___Yes ___No If yes, stipulate where and why:	

Name of Contractor	

PART 2. TECHNICAL PROPOSAL

The Contractor is requested to submit a complete response to each of the items listed in this technical proposal form. If the question is not applicable, please provide a response after each question or section with the words: NOT APPLICABLE TO THIS PROJECT. Responses requiring additional space should be brief and submitted as an attachment to this section.

2. Reputation of Vendors and of the Vendor's Goods or Services (5 Points out of 100 Possible Points in the Selective Criteria)

2 a. References (5 Points of the 5 points Possible under Reputation of Vendors and of the Vendor's Goods or Services)

Provide five projects, from five separate organizations, with appropriate references using the attached form. Answer the questions for each relevant project, with emphasis on school, educational, and/or renovation experience, that your organization has in-progress or completed in the last four years, using the format below:

A member of the Evaluation Committee will verify the information with the references provided and may ask additional questions of the references. Contractor should ensure availability of the references after bid opening.

SECTION 00 41 13 – TECHNICAL PROPOSAL FORM

Name of Contractor	

Project No. _____:

Owner / Name and Location of Project:	
Type of Project: (Renovation, Remodeling, Addition, New Construction?)	
Procurement Method: (Competitive Bidding, CSP, CM at Risk, Other)	
Type of Contract: (Lump Sum, Cost Plus, T&M, other)	
Contract Amount: (at time of award)	
Final Contract Amount: (If in progress, contract amount to date)	
Contract Time: (at time of award)	
Percent Complete:	
Projected/Actual Completion Date:	
If completed, was the project completed on time? If in progress, is the project on schedule?	
What kind of delays occurred?	
Did Contractor operate in a safe manner? Was safety a priority to the Contractor?	
Reporting Tools used: (Daily reports, weekly reports, monthly reports)	
Superintendent's Name: Project Manager's Name:	
Owner* or Appropriate Owner's Representative** Reference Contact Name/Telephone/Email/Address: *If reference iPros no longer employed by the Owner indicate current Employer and Title. **Program Managers cannot be used as a reference from a past projects on one of their own current projects.	

Name of Contractor	

Proposer should copy this form for use on 5 past projects.

3. The Quality of the Vendor's Goods or Service (12 Points out of 100 Possible Points in the Selective Criteria)

3 a. Safety Plan and Insurance Rate Modifier (IRM): (5 Points of the 12 points Possible under Criteria 3)

A. List your organization's Insurance Rate Modifier (IRM) for the current year as obtained from your insurance agent. Copy of IRM from insurance agent to be attached as confirmation.

_____current year IRM

B. Complete the matrix for the five past years, as obtained from OSHA No. 300 Log:

	Year _____	Year _____	Year _____	Year _____	Current Year _____
Number of injuries and illnesses					
Number of lost time accidents					
Number of recordable cases					
Number of fatalities					
Number of employee direct hire fixed hours worked (round to 1,000's)					

C. Are regular project safety meetings held by Field Supervisor(s)? _____Yes _____No

If yes, frequency: ___Weekly ___Bi-Weekly ___Monthly ___As Needed

D. Are project safety inspections conducted? _____Yes _____ No

If yes, who performs inspection? _____

How often? ___Weekly ___Bi-Weekly ___ Monthly ___As Needed

E. Does your organization have a written safety program? _____Yes _____No

If yes, two copies of the full safety manual must be provided. Two CD-ROMs, each containing the safety manual in PDF format clearly marked as “Safety Manual” is preferred.

If no, then the contractor may adopt the Dallas ISD Safety manual. Will your organization adopt the DALLAS ISD Safety Manual? _____Yes _____No

Name of Contractor	

F a. Does your organization have a safety orientation program for new employees?

____Yes ____No

For employees promoted to Field Supervisor. ____Yes ____No

If yes, does your Supervisor Safety Program include instructions on the following topics?

	Yes	No
Safety work practices		
Toolbox safety meetings		
First aid procedures		
Accident investigation		
Fire protection		
HazCom Program		
Record keeping		
Emergency response procedures		
New worker orientation		

F b. Provide a resume of the Safety Manager.

G. Does your organization have a written Drug and Alcohol policy in place? ____Yes _____No

If yes, provide a copy of the policy as an attachment.

If no, please note when adopting the Dallas ISD safety manual, the contractor is also adopting the “Drug and Alcohol Policy” included within.

3 b. Proposed Project Team(s) and Management approach to proposed projects and Contractor’s Pending Claims and or Litigation: (7 Points of the 12 points Possible under Criteria 3)

Please note that Dallas ISD requires a full-time superintendent to be assigned to each individual job site while Work is in progress, contingent upon the continued employment of those personnel by the Contractor. Contractor’s staffing approach and organization must reflect this requirement. Contractor may not make any changes to these personnel assignments without the prior approval of the Program Manager and the Owner.

A. Provide a Staff Organization Chart depicting your staff roles, relationships, and responsibilities.

B. Identify the proposed key staff: Project Manager, Superintendent, Assistant Superintendent(s), Cost Estimator, Scheduler, Safety Manager, etc. by name and title and provide the following information for each. Include additional key staff, as necessary. Indicate which staff are assigned either on a full time or part time basis. For part time personnel, identify the percent of full-time participation. For example, Project Manager 50% of Full-time, Safety Manager 75% of Full-Time, Scheduler 25% of Full-Time, etc.

Name of Contractor	

Staff: Project Manager

Name:	
Current Assignment: (Project name, client name and anticipated project completion date.)	
Total years of construction experience:	
Full Time or Part Time (For part time personnel, identify the percent of full-time participation. For example, Project Manager 50% of Full-time, etc.)	
Relevant experience with similar projects: (educational and/or renovations and/or additions as applicable)	
Years with the Organization:	

Staff: Superintendent 1 – School Name:_____

Name:	
Current Assignment: (Project name, client name and anticipated project completion date.)	
Total years of construction experience:	
Relevant experience with similar projects:	
Years with the Organization:	

Staff: Superintendent 2 – School Name:_____

Name:	
Current Assignment: (Project name, client name and anticipated project completion date.)	
Total years of construction experience:	
Relevant experience with similar projects:	
Years with the Organization:	

Name of Contractor	

Staff: Superintendent 3 – School Name:_____

Name:	
Current Assignment: (Project name, client name and anticipated project completion date.)	
Total years of construction experience:	
Relevant experience with similar projects:	
Years with the Organization:	

Staff: Superintendent 4 – School Name:_____

Name:	
Current Assignment: (Project name, client name and anticipated project completion date.)	
Total years of construction experience:	
Relevant experience with similar projects:	
Years with the Organization:	

Staff: Superintendent 5 – School Name:_____

Name:	
Current Assignment: (Project name, client name and anticipated project completion date.)	
Total years of construction experience:	
Relevant experience with similar projects:	
Years with the Organization:	

Proposer should copy this form as needed to present information for all proposed staff.

C. CONTRACTOR'S PENDING CLAIMS AND/OR LITIGATION

Attach a list of pending claims and/or litigation at time of submitting Proposal. (Show project name, owner, and summary explanation.)

Name of Contractor	

4 The Extent to which the Goods or Services Meet the District's needs (15 Points out of 100 Possible Points in the Selective Criteria)

4 a. General Contractor's current/past K-12 new or renovation construction experience: (10 Points of the 15 points Possible under Criteria 4)

Provide below the School District, School Name, Project Type, **Completion Date** and **Final Construction Value** for a **minimum of 5**** K-12 Projects completed by your company **as a prime contractor**.

School District	School Name	Renovation, Addition, or New Const.	Completion Date	Final Construction Contract Value

***A separate sheet may be attached with additional projects.*

4 b. Proposed Construction schedule and phasing plan: (5 Points of the 15 points Possible under Criteria 4)

The Contractor understands that Dallas ISD desires that the Project be completed on or before the duration of the contract. The Contractor shall prepare and submit a proposed construction schedule for each of the schools in the CSP and present this schedule with Section 00 41 13. **Additions and Renovations work within a school must be broken out into two separate items**. This schedule may be as detailed as the Proposer would like but must have a minimum of schedule information (major construction phases, activities, and milestones) as is necessary to facilitate negotiations.

Provide, as an attachment to the Technical Proposal form, a GANTT chart depicting how you anticipate delivering the project in the time frame outlined in this proposal. Describe the scope of work to be completed in each phase of each school.

Note: Contractors may, as a Cost Saving Recommendation, offer for Dallas ISD's consideration, an alternative plan, which may alter the duration in the contract documents. However, any such proposal must be presented as a Cost Saving Recommendation in the Technical Proposal – Part B (Section 00 41 13). The contractor must clearly identify the alternative work schedule, alternative duration, and alternative base price. The evaluation committee will evaluate alternative plans and schedule and determine if the plans may benefit Dallas ISD.

Name of Contractor	

The Contractor's proposed schedule is a vital part of the evaluation process and sufficient information should be provided for Dallas ISD to assess the Contractor's time frame, work plan and approach.

A. Describe the type of software utilized to prepare the construction schedules. **(Attach proposed project schedule)**

Name of Contractor	

5. The Vendor's Past Performance with the District (5 Points out of 100 Possible Points in the Selective Criteria)

5 a. Past Project Performance, Quality, and Compliance with Terms and Regulations (5 Points of the 100 points Possible under Criteria 5).

The District will evaluate the quality of construction and materials used. Check for transparency in reporting and communication. Check for excessive claims or disputes with clients. Contractor's ability to adhere to district directives, procedures, and requirements. Assess adherence to project timelines and budgets. Ensure good business practices (i.e. receivables, payments, deliverables).

Name of Contractor	

6. The contractor is to complete all Small Business Office Compliance forms in Section 00 45 39 for selection criteria 6. (Category Total: 20 Points of the 20 Points possible under Criteria 6.)

6a. Proposer demonstrated a commitment to the district's Small Business Office /WBE program by providing enhancements to the administration of the proposer's contracting process for the work to be done be M/WBE firms. Examples of this commitment may include any of the following: expedited payments, Mentor Protégé Programs, early release of retainage, expanding the pool of diverse subcontractors to firms that have not done business with the district, etc. (3 points)

6b. Proposer submitted a list of two (2) Small Business Office subcontractor references. (2 points)

6c. Proposer is a certified M/WBE, or Proposer submitted a Joint Venture Agreement with a certified M/WBE OR Proposer submitted a Prime Subcontractor Teaming Agreement with a certified M/WBE. (5 points)

6d. Proposer submitted a diverse list of certified M/WE subcontractors, subconsultants or suppliers that meets or exceeds the district's M/WBE aspirational goal in meaningful and significant roles OR Proposer demonstrated outreach designed to meet the M/WBE project goals with a diverse M/WBE team of subcontractors, suppliers and subconsultants. (5 points)

6e. Proposer demonstrated a comprehensive framework and understanding of the district's M/WBE program by: providing a written and detailed M/WBE compliance plan, designating a high ranking individual who will be responsible for M/WBE contract compliance, monitoring and reporting, ensuring no unauthorized changes to M/WBE subcontractors, adhering to the M/WBE commitment and subcontractor payment terms, executing the M/WBE subcontracting schedule, complying with the district's M/WBE Program guidelines, etc. (5 points)

Name of Contractor	

7. The Total Long-Term Cost to the District to Acquire the Vendor's Goods and Services (3 Points out of 100 Possible Points in the Selective Criteria)

7 a. Financial status of the vendor (as rated by Dun & Bradstreet):
Category Total: (3 Points of the 3 points Possible under Criteria 7)

A. Provide the complete corporate or company name of your firm and the D-U-N-S Number as it is recorded with Dun & Bradstreet. This information will allow the owner to confirm that the correct reports are being used for the evaluation.

D-U-N-S Number: _____

Name of Contractor	

C8. ADDITIONAL INFORMATION:
The following information must be provided to complete the evaluation of the Contractor's technical proposal.

A. DISCLOSURE OF INTERESTED PARTIES

1. Disclosure of Interested Parties – In 2015, the Texas Legislature adopted House Bill 1295, which added section 2252.908 of the Government Code. The law states that a governmental entity or state agency may not enter into certain contracts with a business entity unless the business entity submits a disclosure of interested parties to the governmental entity or state agency at the time the business entity submits the signed contract to the governmental entity or state agency. The disclosure requirement applies to a contract entered into on or after January 1, 2016.

After Board of Trustee authorization, the successful Vendor will be required to complete an electronic Form 1295 on the Texas Ethics Commission website (https://www.ethics.state.tx.us/whatsnew/elf_info_form1295.htm) prior to entering into a contract with the District in accordance with this statute. Additional information is available on the Texas Ethics Commission website at www.ethics.state.tx.us.

Submission of a response to this CSP indicates Respondent's acceptance and intended compliance with this requirement.

Name of Contractor	

PART 3. TECHNICAL PROPOSAL FORM EXECUTION

3.01 Proposal Form Execution

Contractor's Firm Name (legal name)	
Federal Tax I. D. Number	
Contractor's Street Address	
Contractor's Phone Number	
Contractor's Email Address	

SUBMITTED BY:

(Corporation, Partnership, Individual, etc.)

Name of President of Corporation *or*
Name of Principal Owner

Name of Secretary of Corporation
(if applicable)

(Corporation, Partnership, etc.,) is organized under the laws of the State of _____.

Firm: _____

By: _____

Title: _____

Legal Address: _____

_____

Date: _____
Affix Corporation Seal here (if applicable)

SECTION 00 43 13 – PROPOSAL GUARANTEE BOND

Name of Contractor	

KNOW ALL MEN BY THESE PRESENTS, THAT we _____ as Principal, and _____ as Surety, are held and firmly bound unto the Board of Trustees, Dallas Independent School District, Dallas, Dallas County, Texas, hereinafter called the Obligee, in the penal sum of _____ Dollars ($_____), lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal has submitted the accompanying Competitive Sealed Proposal, dated _____, 20_____, being for the construction of _____ with appurtenances thereto, at Dallas, Dallas County, Texas, the kind and extent of work involved being set forth in detail in the proposed Contract Documents;

NOW, THEREFORE, if the Obligee shall accept the proposal of the Principal and the Principal shall enter into a Contract with the Obligee in accordance with the terms of such proposal, and give such bond or bonds as may be specified in the proposal or Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Principal to enter such Contract and give such bond or bonds, if the Principal shall pay to the Obligee the difference not to exceed the penalty hereof between the amount specified in said proposal and such larger amount for which the Obligee may in good faith contract with another party to perform the Work covered by said proposal, then this obligation shall be null and void, otherwise to remain in full force and effect.

This Proposal Guarantee Bond applies to all contracts in excess of $100,000 involving a contract for construction, alteration or repair of any public building or the completion or prosecution of any public work.

This Proposal Guarantee Bond must be payable to the awarding authority, Dallas Independent School District, as the named Obligee, and it must be approved as to form by such awarding authority.

Surety must be corporate surety duly authorized to do business in Texas.

This Proposal Guarantee Bond must be equal to 10% of the full amount of the contract which it secures.

Power of Attorney from Corporate Surety should be attached to this Proposal Guarantee Bond.

Name of Contractor	

IN WITNESS WHEREOF, the above bounded parties have executed this instrument under their several seals this _____ day of _____, 20_____, the name and Corporate Seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

(Business Address)	(Individual Principal)
(Business Address)	(Corporate Principal)
ATTEST:	
Secretary	President
Business Address	Corporate Surety
ATTEST: _____	BY: _____

PART 1 GENERAL

Schedule "A"
Building Construction Prevailing Wage Rates 2012
City of Dallas

Building Construction Projects (does not include single-family homes and apartments).

**Use Schedule B - Current Engineering (Highway/Heavy) Construction Wage Determination For Paving and Utilities Incidental to Building Construction.*

Schedule "A"

CLASSIFICATION	PREVAILING RATE	FRINGES
Acoustical Installer	$12.16	---
Backhoe Operator	$10.64	$1.41
Bricklayer	$21.06	$7.18
Brick, Tender	$8.60	$1.30
Carpenter	$23.15	$8.20
Cement Mason/Concrete Finisher	$11.38	---
Drywall Hanger	$11.71	---
Electrician	$24.50	12.25% + 4.70
Electrician, Cable Splicer	$26.41	4.50 + 12.5%
Floor Layer, Carpet	$13.13	---
Front End Loader Operator	$8.77	---
Glazier	$12.26	$1.10
Mechanical Insulator	$10.55	$1.00
Laborer, Unskilled (Excluding Landscape Laborers)	$7.58	$1.30
Painter Brush & Spray	$10.76	$2.20
Painter doing drywall finishing only	$10.42	---
Paperhanger	$11.30	$2.20
Lather	$17.38	$1.04
Hydraulic Crane (35 tons & under)	$23.70	$9.35
Hydraulic over 35 tons, Derricks, Overhead Gentry, Stiffler, Tower, etc., and Cranes with Pile driving or Caisson Attachments	$24.70	$9.35
Plasterer	$15.06	$2.94
Plasterer tender	$9.00	---
Plumber	$12.80	$1.63
Roofer	$9.45	$1.04
Sheet Metal Worker (Including HVAC Duct Work)	$12.80	$2.05
Sprinkler Fitter (Fire Sprinkler)	$25.84	$16.47
Iron Worker, Structural	$21.60	$4.40
Iron Worker, Reinforcing	$10.33	$2.94
Tile Setter	$13.75	------- --

Schedule "B"

CLASSIFICATION	PREVAILING RATE
Asphalt Distributor Operator	$15.32
Asphalt Paving Machine Operator	$13.99
Asphalt Raker	$12.69
Broom or Sweeper Operator	$11.74
Concrete Finisher -Paving and Structures	$14.12
Concrete Paving Finishing Machine	$16.05
Concrete Paving Saw Operator	$14.48
Crane Operator, Lattice Boom 80 Tons or Less	$17.27
Crane Operator, Lattice Boom over 80 Tons	$20.52
Crane, Hydraulic 80 Tons or Less	$18.12
Crawler Tractor	$14.07
Electrician	$19.80
Excavator, 50,000 Pounds or Less	$17.19
Excavator, over 50,000 Pounds	$16.99
Flagger	$10.06
Form Builder/Setter, Structures	$13.84
Form Setter -Paving & Curb	$13.16
Foundation Drill Operator, Crawler Mount	$17.99
Foundation Drill Operator, Truck Mount	$21.07
Front End Loader 3 CY or Less	$13.69
Front End Loader, over 3 CY	$14.72
Laborer -Common	$10.72
Laborer -Utility	$12.32
Loader / Backhoe	$15.18
Mechanic	$17.68
Milling Machine	$14.32
Motor Grader, Fine Grade	$17.19
Motor Grader, Rough	$16.02
Pavement Marking Machine	$13.63
Pipe Layer	$13.24
Reclaimer / Pulverizers	$11.01
Roller, Asphalt	$13.08
Roller, Other	$11.51
Scraper	$12.96
Servicer	$14.58
Small Slipform Machine	$15.96
Spreader Box	$14.73
Steel Worker (Reinforcing)	$16.18
Truck Driver -Lowboy -Float	$16.24
Truck Driver -Off Road Hauler	$12.25
Truck Driver -Single Axle	$12.31
Truck Driver -Single or Tandem Axle Dump Truck	$12.62
Truck Driver -Tandem Axle Tractor with Semi Trailer	$12.86
Truck Driver -Transit Mix	$14.14
Tunnel Boring Machine Operator (greater than 48")	$13.61
Tunneling Machine Operator (48" or less)	$9.16
Welder	$14.84

Work Zone Barricade Servicer	$11.68

If the construction project involves the expenditure of federal funds of $2,000 or more, the minimum wages to be paid various classes of laborers and mechanics will be based upon the wages that will be determined by the Secretary of labor to be prevailing for the corresponding classes of laborers and mechanics employed on the project of a character similar to the contract work in the City of Dallas.

Except for work on legal holidays, the "General Prevailing Rate of Per Diem Wage" for the various crafts or type of workers or mechanics is the product of (A) the number of hours worked per day, except for overtime hours, times (B) the above respective rate per hour.

For legal holidays, the "General Prevailing Rate of Per Diem Wage" for the various crafts or type of workers or mechanics is the product of (A) one and one-half times the above respective rate per hour times (B) the number of hours worked on the legal holiday.

The "General Prevailing Rate for Overtime Work" for the crafts or type of workers or mechanics is one and one-half times the above respective rate per hour.

Under the provisions of Chapter 2258 of the Government Code, the contractor shall forfeit as a penalty to the entity on whose behalf the contract is made or awarded, sixty dollars ($60.00) for each laborer, worker or mechanic employed, for each calendar day, or portion thereof, such laborer, worker or mechanic is paid less than the said stipulated rates for any work under the contract, by him, or by any subcontractor under him.

Solicitation Number: 208290
Solicitation Title: ORG 023 – DAVID W. CARTER HIGH SCHOOL – ADDITION AND RENOVATION

REPRESENTATION AND CERTIFICATION

By submitting this Offer, the Offeror certifies that he/she is a responsible authorized officer of the company and certifies the accuracy of the following statements:

1. Represents that to the best of its knowledge it is not indebted to the District. **Indebtedness** to the District shall be basis for non-award and/or cancellation and/or termination of any award.
2. By signing this bid/proposal, vendor makes the assurance that vendor has not been debarred or suspended from conducting business with the US Government according to Executive Order 12549 entitled "**Debarment and Suspension**."
3. Pursuant to the Texas Education Code, Subchapter B, Section 44.034, "**Notification of Criminal History**", a person or business entity that enters into a contract with a school district must give advance notice to the district if the person and/or an owner or operator of the business entity has been convicted of a felony. The notice must include a general description of the conduct resulting in the conviction of a felony. Subsection (b) states "a school district may terminate a contract with a person or business entity if the district determines that the person or business entity failed to give notice as required by Subsection (a) or misrepresented the conduct resulting in the conviction. The district must compensate the person or business entity for services performed before the termination of the contract." Subsection (c) this notice is not required of a publicly held corporation.
   1.___My firm is a publicly held corporation, therefore, this reporting requirement is not applicable.
   2.___My firm is not owned nor operated by anyone who has been convicted of a felony.
   3.___My firm is owned or operated by the following individual(s) who has/have been convicted of a felony.
   Name of Felon(s):_____
   Details of Conviction(s):_____

4. "**Non-Collusion Statement**" and "**Anti-Lobbying Certification**": "The undersigned affirms that they are duly authorized to execute this Representation and Certification, Offer, and/or Contract and that this company, corporation, firm, partnership, etc., or individual has not prepared this bid in collusion (*An agreement between two or more persons to deceive the school district or defraud the school district of its rights*) with any other bidder, school board member, or school district employee, and that the contents of this bid as to prices, quality of product, terms and/or conditions, etc., have not been communicated by the undersigned nor by any other employee, agent and/or representative of the company, corporation, firm, partnership, etc., or individual to any other person engaged in this type of business prior to the official opening of this bid for the intent or purpose of collusion." In accordance with Title 31, USC Section 1352, no attempt has been or will be made by this company's officers, employees, or agents to lobby, directly or indirectly, with the District's Board of Trustees between bid/proposal submission date and award by the Board.

5. The District promotes, to the maximum extent allowed by law, participation by **economically disadvantaged business enterprises** in all District competitive procurement. Are you a qualified economically disadvantaged business enterprise, historically underutilized business, or minority/women owned business enterprise?
   (check one) _____ **Yes** _____ **No**
   Type of Certification: _____
   Issued by: _____ **Date of Issue:** _____
   Please attach proof of certification to this submittal. **Certified by:** _____

6. "**Conflict of Interest**": No officer, agent, or stockholder of the Offeror is a member of the staff, or related to any employee of the District except as noted herein: _____.
   Texas Statute enacts disclosure requirements if certain school officials or family members receive a gift (other than gifts of food, lodging, transportation, or entertainment accepted as a guest) that had an aggregate value of $250 or more over a twelve-month period that the district is considering or has awarded a contract for the sale or purchase of property, goods, or services. Has your firm, parent firm, subsidiary, and/or affiliate provided a gift (other than gifts of food, lodging, transportation, or entertainment accepted as a guest) that had an aggregate value of $250 or more over a twelve-month period to any District official, administrator, and/or Board member? [ ] Yes [ ] No
   If yes, explain (the gift, name of individual receiving gift, date gift was provided, etc.)._____
   _____ **(COMPLETE THE ATTACHED QUESTIONNAIRE FORM)**

7. Offeror agrees to the attached "**General Terms and Conditions**" and any "**Special Terms and Conditions**" (if applicable) of this solicitation and in case of conflict with other documents provided by Offeror, these General and/or Special Terms and Conditions take precedence and prevail unless specifically identified and changes are signed by both parties.

8. "**Insurance, Bonds**": Insurance and/or bond requirements are enumerated elsewhere in Contract documents. Submission of a certificate of insurance/bond by the undersigned (or an agent/broker on behalf of the undersigned) represents that the coverages and perils covered by the insurance/bond meet or exceed the requirements of the solicitation document and/or subsequent contract. The District may make reasonable reliance on the submitted certificate of insurance/bond. The certificate of insurance/bond must accurately reflect the policy coverages and will become a part of the Contract Documents and incorporated by reference, but the Contract terms/conditions and statement of work take precedence over any and all contents of the certificate of insurance/bond including, but not limited to, disclaimers, qualifications, etc. Failure to provide insurance/bond in accordance with Contract may be cause for termination for default and other remedies allowed by law and/or equity. Offeror must notify the District entity, in writing, by certified mail or personal delivery, within ten days after the vendor knew or should have known of any changes that materially affects the insurance/bond coverage.

9. "**Workers Compensation**": Offeror acknowledges that the District will NOT provide Workers Compensation coverage to the Offeror and Offeror represents to the District that all employees, subcontractors, agents, representatives, etc. of the Offeror who will provide products, goods, or services to the District will be covered by worker's compensation coverage for the duration of the Contract, that the coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of a self-insured, with the commission's Division of Self-Insurance regulation. Providing false or misleading information may subject the contractor to administrative penalties, criminal penalties, civil penalties, or other civil actions.

10. "**Criminal Background Checks/Searches**": Offeror represents that criminal background checks/searches have been conducted (or will be conducted prior to start of Work if required) in accordance with the General Terms and Conditions (Criminal Background Check) and "Instructions to School District Contractors Regarding Criminal History Background Searches Under Texas Education Code (TEC) 22.0834" (attached).

11. **"No Boycott of Israel".** Offeror certifies that it (and any of its affiliates or parent company), does not, and will not, boycott Israel during the term of any contractual arrangement with DALLAS ISD. For purposes of any contractual arrangement with DALLAS ISD, "boycott Israel" means refusing to deal with, terminating business activities with, or otherwise taking any action that is intended to penalize, inflict economic harm on, or limit commercial relations specifically with Israel, or with a person or entity doing business in Israel or in an Israeli-controlled territory, but does not include an action made for ordinary business purposes.

12. **"Prohibition of Contracts Engaged in Business with Iran, Sudan, or Foreign Terrorist Organizations"**. Offeror certifies that it is not a company identified by the Texas Comptroller as a company known to have contracts with or provide supplies or services to a foreign terrorist organization.

13. **"Transactions with an Abortion Provider or Affiliate".** Offeror certifies that it is not an abortion provider nor an affiliate of such a provider as noted in Texas SB 22, codified in Texas Government Code Chapter 2273, and effective September 1, 2019. If this provision is violated by Offeror, Agreement and/or taxpayer resource transaction is voidable by Dallas ISD and Offeror agrees to defend and indemnify Dallas ISD against any action brought by the Office of the Attorney General for a violation of Section 2273.003.

I, the undersigned officer or authorized agent for the firm named below, certify that the information provided herein has been reviewed by me and is true to the best of my knowledge.

Company Name: _____ **Submitter's Name/Title:** _____

Email Address: _____

Submitter's Signature: _____ **Telephone No.** _____

Address: _____ **City, State and Zip Code:** _____

Fax No. _____ **Date:** _____

THIS SHEET MUST BE COMPLETED, SIGNED, AND RETURNED WITH FIRM'S OFFER.

Conflict of Interest Disclosure Statements
Texas Local Government Code, Chapter 176

Offerors are required to file a Conflict of Interest Questionnaire with the District if a relationship exists between the Offeror's company and an officer of the District. Offerors are encouraged to review and become familiar with all disclosure requirements of Texas Local Government Code, Chapter 176. Conflicts of interest exist if:

1. the person has employment or other business relationship with the local government officer or a family member resulting in the officer or family member receiving taxable income; or
2. the person has given the local government officer or family member one or more gifts (excluding food, lodging, transportation, and entertainment) that have an aggregate value of more than $250 in the twelve- month period preceding
the date the officer becomes aware of an executed contract or consideration of the person for a contract to do business with the District.

Disclosure is required from Offerors regarding each affiliation or business relationship between the Offeror and:

1. an officer of the District;
2. an officer of the District that results in the officer or family member receiving taxable income;
3. an officer of the District that results in the Offeror receiving taxable income that does not come from the District;
4. a corporation or other business entity in which an officer of the District serves as an officer or director, or holds an ownership interest of 10% or more;
5. an employee or Offeror of the District who makes recommendations to an officer of the District regarding the expenditure of money;
6. an officer of the District who appoints or employs an officer of the District that is the subject of the questionnaire; and
7. any person or entity that might cause a conflict of interest with the District.

If a conflict exists, forms must be filed:

1. No later than the seventh business day after the date that the person begins contract discussions or negotiations with the government entity, or submits to the entity an application, response to a request for qualification or bid, correspondence, or other writing related to a potential agreement with the entity.

2. The Offeror also shall file an updated questionnaire:
    a. not later than September 1 of each year in which a covered transaction is pending, and
    b. the seventh business day after the date of an event that would make a statement in the questionnaire incomplete or inaccurate.

3. A Offeror is not required to file an updated questionnaire if the person had filed an updated statement on or after June 1, but before September 1 of the year.

Officers of the Dallas Independent School District are:

Lance Currie (District 1)
Sarah Weinberg (District 2)
Dan Micciche (District 3)
Prisma Y. Garcia (District 4)
Byron Sanders (District 5)
Joyce Foreman (District 6)
Ben Mackey (District 7)
Joe Carreon (District 8)
Ed Turner (District 9)
Stephanie Elizalde, Ed.D. Superintendent of Schools

If no conflict of interest exists, you must fill out Box 1 and type N/A on Box 3 of the CIQ form, sign and date it.

If you are required to file, send the completed form to Dallas Independent School District, Procurement Services Department, 9400 North Central Expressway Suite 1510, Dallas, Texas 75231

July 2022

CONFLICT OF INTEREST QUESTIONNAIRE

FORM CIQ

For vendor doing business with local governmental entity

This questionnaire reflects changes made to the law by H.B. 23, 84th Leg., Regular Session.

This questionnaire is being filed in accordance with Chapter 176, Local Government Code, by a vendor who has a business relationship as defined by Section 176.001(1-a) with a local governmental entity and the vendor meets requirements under Section 176.006(a).

By law this questionnaire must be filed with the records administrator of the local governmental entity not later than the 7th business day after the date the vendor becomes aware of facts that require the statement to be filed. *See* Section 176.006(a-1), Local Government Code.

A vendor commits an offense if the vendor knowingly violates Section 176.006, Local Government Code. An offense under this section is a misdemeanor.

OFFICE USE ONLY

Date Received

1 **Name of vendor who has a business relationship with local governmental entity.**

2 ☐ **Check this box if you are filing an update to a previously filed questionnaire.** (The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than the 7th business day after the date on which you became aware that the originally filed questionnaire was incomplete or inaccurate.)

3 **Name of local government officer about whom the information is being disclosed.**

_____
Name of Officer

4 **Describe each employment or other business relationship with the local government officer, or a family member of the officer, as described by Section 176.003(a)(2)(A). Also describe any family relationship with the local government officer. Complete subparts A and B for each employment or business relationship described. Attach additional pages to this Form CIQ as necessary.**

A. Is the local government officer or a family member of the officer receiving or likely to receive taxable income, other than investment income, from the vendor?

☐ Yes ☐ No

B. Is the vendor receiving or likely to receive taxable income, other than investment income, from or at the direction of the local government officer or a family member of the officer AND the taxable income is not received from the local governmental entity?

☐ Yes ☐ No

5 **Describe each employment or business relationship that the vendor named in Section 1 maintains with a corporation or other business entity with respect to which the local government officer serves as an officer or director, or holds an ownership interest of one percent or more.**

6 ☐ Check this box if the vendor has given the local government officer or a family member of the officer one or more gifts as described in Section 176.003(a)(2)(B), excluding gifts described in Section 176.003(a-1).

7

_____ _____
Signature of vendor doing business with the governmental entity Date

Form provided by Texas Ethics Commission www.ethics.state.tx.us Revised 11/30/2015

CONFLICT OF INTEREST QUESTIONNAIRE
For vendor doing business with local governmental entity

A complete copy of Chapter 176 of the Local Government Code may be found at http://www.statutes.legis.state.tx.us/Docs/LG/htm/LG.176.htm. For easy reference, below are some of the sections cited on this form.

Local Government Code § 176.001(1-a): "Business relationship" means a connection between two or more parties based on commercial activity of one of the parties. The term does not include a connection based on:

(A) a transaction that is subject to rate or fee regulation by a federal, state, or local governmental entity or an agency of a federal, state, or local governmental entity;

(B) a transaction conducted at a price and subject to terms available to the public; or

(C) a purchase or lease of goods or services from a person that is chartered by a state or federal agency and that is subject to regular examination by, and reporting to, that agency.

Local Government Code § 176.003(a)(2)(A) and (B):

(a) A local government officer shall file a conflicts disclosure statement with respect to a vendor if:

***

(2) the vendor:

(A) has an employment or other business relationship with the local government officer or a family member of the officer that results in the officer or family member receiving taxable income, other than investment income, that exceeds $2,500 during the 12-month period preceding the date that the officer becomes aware that

(i) a contract between the local governmental entity and vendor has been executed; or

(ii) the local governmental entity is considering entering into a contract with the vendor;

(B) has given to the local government officer or a family member of the officer one or more gifts that have an aggregate value of more than $100 in the 12-month period preceding the date the officer becomes aware that:

(i) a contract between the local governmental entity and vendor has been executed; or

(ii) the local governmental entity is considering entering into a contract with the vendor.

Local Government Code § 176.006(a) and (a-1)

(a) A vendor shall file a completed conflict of interest questionnaire if the vendor has a business relationship with a local governmental entity and:

(1) has an employment or other business relationship with a local government officer of that local governmental entity, or a family member of the officer, described by Section 176.003(a)(2)(A);

(2) has given a local government officer of that local governmental entity, or a family member of the officer, one or more gifts with the aggregate value specified by Section 176.003(a)(2)(B), excluding any gift described by Section 176.003(a-1); or

(3) has a family relationship with a local government officer of that local governmental entity.

(a-1) The completed conflict of interest questionnaire must be filed with the appropriate records administrator not later than the seventh business day after the later of:

(1) the date that the vendor:

(A) begins discussions or negotiations to enter into a contract with the local governmental entity; or

(B) submits to the local governmental entity an application, response to a request for proposals or bids, correspondence, or another writing related to a potential contract with the local governmental entity; or

(2) the date the vendor becomes aware:

(A) of an employment or other business relationship with a local government officer, or a family member of the officer, described by Subsection (a);

(B) that the vendor has given one or more gifts described by Subsection (a); or

(C) of a family relationship with a local government officer.

Form provided by Texas Ethics Commission www.ethics.state.tx.us Revised 11/30/2015

Solicitation Number: 208290
Solicitation Title: ORG 023 – DAVID W. CARTER HIGH SCHOOL – ADDITION AND RENOVATION
Dallas ISD, 9400 North Central Expressway, Dallas, TX 75231

FELONY CONVICTION NOTICE

Statutory citation covering notification of criminal history of contractor is found in the Texas Education Code #44.034. Following is an example of a felony conviction notice:

FELONY CONVICTION NOTIFICATION

State of Texas Legislative Senate Bill No. 1, Section 44.034, Notification of Criminal History, Subsection (a), states "a person or business entity that enters into a contract with a school district must give advance notice to the district if the person or an owner or operator of the business entity has been convicted of a felony. The notice must include a general description of the conduct resulting in the conviction of a felony."

Subsection (b) states "a school district may terminate a contract with a person or business entity if the district determines that the person or business entity failed to give notice as required by Subsection (a) or misrepresented the conduct resulting in the conviction. The district must compensate the person or business entity for services performed before the termination of the contract."

THIS NOTICE IS NOT REQUIRED OF A PUBLICLY-HELD CORPORATION

I, the undersigned agent for the firm named below, certify that the information concerning notification of felony convictions has been reviewed by me and the following information furnished is true to the best of my knowledge.

A. [ ] My firm is a publicly-held corporation, therefore, this reporting requirement is not applicable.

B. [ ] My firm is not owned nor operated by anyone who has been convicted of a felony:

C. [ ] My firm is owned or operated by the following individual(s) who has/have been convicted of a felony:

Name of Felon(s): _____

Details of Conviction(s): _____

_____

Company Name:_____ Submitter's Name/Title:_____

Address:_____City, State and Zip Code:_____

Email Address: _____

Submitter's Signature:_____Telephone No._____

Fax No._____800 # (if available)_____

Date:_____

Solicitation Number: 208290
Solicitation Title: ORG 023 – DAVID W. CARTER HIGH SCHOOL – ADDITION AND RENOVATION

IDENTIFICATION BADGE(S)

1. Identification Badge: Offeror's employees, agents, and consultants and subcontractors, subject to the criminal history record review requirement shall be identified by a photographic identification badge.

2. If the Offeror is the person or owner or operator of the business entity, that individual may not self-certify regarding the criminal history record information and its review and must submit original evidence acceptable to the District with this Agreement showing compliance.

3. Pursuant to Dallas ISD's Board Policy CJA (LOCAL) Purchasing and Acquisition:

   All contracts must comply with the requirements for criminal background checks. All vendors must give advance notice to the District if the person or an owner or operator of the business entity has been convicted of a felony. The notice must include a general description of the conduct resulting in the conviction of a felony. The District may terminate any resulting agreement if the District determines that the person or business entity failed to provide notice as required by this paragraph or misrepresented the conduct resulting in the conviction.

4. The above requirement is required for all suppliers who will provide a service to Dallas ISD and will be on District property. The background checks and badges must be done through the supplier's company or the District's third-party provider, Field Control Analytics at www.fcbackground.com/clientsignup using project code: VENDISD15 or be issued by the supplier's company.

Company Name:_____ Submitter's Name/Title:_____

Address:_____City, State and Zip Code:_____

Email Address: _____

Submitter's Signature:_____Telephone No._____

Fax No._____800 # (if available)_____

Date:_____

Instructions to School District Contractors
Regarding Criminal History Background Searches
Under TEC 22.0835

TEC 22.0834 directs school district contractors (i.e., Company) to obtain state and national criminal history background searches on their employees who will have direct contact with students, and to receive those results through the DPS criminal history clearinghouse (Fingerprint-based Applicant Clearinghouse of Texas –FACT). In order for contractors to receive the information through FACT, they must first establish an account with the DPS for FACT clearinghouse access. The Company owner must sign a user agreement with the DPS. To obtain the user agreement and more information, Company must contact:

Access and Dissemination Bureau
Texas Department of Public Safety
Crime Records Service
P. O. Box 149322
Austin, Texas 78714-9322

Email: FACT@txdps.state.tx.us
Phone: (512) 424-2365

For fastest service, please email or call. State in the message that Company is a school district contractor and needs to have an account established for DPS FACT clearinghouse access. Please include:

Company Name
Company Address
Company Phone
Name of Company point of contact
Phone of Company point of contact
Company email to be used for notification of FACT records and messages

The information in the DPS FACT Clearinghouse is confidential, and access must be restricted to the least number of persons needed to review the records. The account must include at least one designated supervisor to make necessary changes and to monitor the site's security and the access to the criminal history data retrieved. Additional users must be limited to those who need to request, retrieve, or evaluate data regarding the individual applicants.

PLEASE NOTE: After the Company signs the DPS User Agreement for FACT, DPS will provide the Company with a revised ***FAST Fingerprint Pass*** that Company will have to provide to its employees and applicants. Company's employees and applicants will use that ***FAST Fingerprint Pass*** when scheduling their FAST fingerprinting.

Company Name:_____ Submitter's Name/Title:_____

Address:_____City, State and Zip Code:_____

Email Address: _____

Submitter's Signature:_____Telephone No._____

Fax No._____800 # (if available)_____

Date:_____

Name of Contractor	

DALLAS INDEPENDENT SCHOOL DISTRICT
CERTIFICATE OF NON-DISCRIMINATION

In connection with the execution of this Contract, the Contractor shall fully comply with the District non-discrimination requirement cited below.

"The Dallas Independent School District does not discriminate on the basis of sex, disability, race, religion, color, age, gender, sexual orientation, and/or national origin in the educational programs or activities which it operates, and it is required by Title IX, Section 504, Title VII, and the Americans With Disabilities Act not to discriminate in such a manner. This policy not to discriminate extends to employment in and admission to such programs and activities."

Submittal to District of reasonable evidence of discrimination will be grounds for Termination of the Agreement. This policy does not require the employment of unqualified persons.

By the signing of this Certificate, the Contractor signifies that it does not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. It certifies further that it will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it will not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. The undersigned agrees that a breach of this certification is a violation of the Equal Opportunity Clause in this proposed Contract. As used in this certification, the term 'segregated facilities' means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated on the basis of race, creed, color, or national origin, because of habit, local custom, or otherwise. It further agrees that (except where it obtained identical certifications from proposed consultants for specific time period) it will obtain identical certification from proposed Subcontractors prior to the award of a Contract exceeding $10,000.00 which are not exempt from the provisions of the Equal Opportunity Clause; that it will retain such certifications in its files; and that it will forward the following notice to such proposed Subcontractors (except where the proposed Subcontractors have submitted identical certifications for specific time periods): **Notice to Prospective Subcontractors of requirement for certification of non-segregated facilities.** A certification of non-segregated facilities, as required by the May 19, 1967 Order (32 FR. 7439, May 19, 1967) on elimination of segregated facilities, by the Secretary of Labor, must be submitted prior to the award of a Contract exceeding $10,000.00 which is not exempt from the provisions of the Equal Opportunity Clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually, or annually).

Note: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.11."

By: _____ Signature: _____

(PRINT NAME OF PERSON SIGNING FOR CONTRACTOR) (CONTRACTOR REPRESENTATIVE SIGNATURE)

Date: _____ Contractor: _____

SECTION 00 45 22 – NOTIFICATION OF HAZARDOUS MATERIALS

Name of Contractor	

STATE OF TEXAS

COUNTY OF DALLAS

Before me, the undersigned authority on this day personally appeared _____, known to me to be the person whose name is subscribed below, who, on oath stated:

"As the appropriate official of the company, contractor, or subcontractor submitting this affidavit in conjunction with a bid submitted to the Dallas Independent School District, I acknowledge that this company, contractor, or subcontractor has been notified that copies of the Asbestos Hazard Emergency Response Act (AHERA) for the school(s) where such company, contractor or subcontractor has contracted to perform work are available at the individual school library and at the Professional Library at the Dallas Independent School District, 9400 N. Central Expressway, Dallas, Texas 75231. I understand that it is our responsibility to familiarize ourselves with such plans and that it is our responsibility to inform every worker that we use on this project as to the availability of these plans.

We also acknowledge that we will be required to obtain written clearance from the Dallas Independent School District, Bureau of Hazardous Materials Management, prior to executing any work on this project."

_____

Name of Company

Signature _____

Name _____

Title _____

STATE OF TEXAS

COUNTY OF DALLAS

Sworn to and subscribed before me at Dallas, Texas this the _____ day of _____, 20 _____, A.D.

_____

Notary Public in and for Dallas County, Texas

FAMILY CONFLICT OF INTEREST QUESTIONNAIRE

This Questionnaire must be completed by every individual or entity that contracts or seeks to contract with the District for the sale or purchase of property, goods, or services.

The questionnaire(s) required by this policy shall be filed with the Director of Procurement Services not later than the seventh (7TH) business day after the date that the individual or entity begins contracts discussions or negotiations with the District or submits to the District an application, response to a request for proposals or bids, correspondence, or other writing related to a potential agreement with the District. If the individual or entity becomes aware of new facts or change of facts that would make the completed questionnaire(s) inaccurate, the individual or entity shall file an amended questionnaire(s) within seven (7) days of the date the individual or entity first learned of the new facts or changes in facts.

Family or family relationship means a member of an individual's immediate family, including spouse, parents, children (whether natural or adopted), aunts, uncles, and siblings.

For individuals who contract or seek to contract with the District for the sale or purchase of any property, goods, or services:

> Identify each and every family relationship between yourself (and any member of your family) and any full-time District Employee (and any member of such employee's family) (please include name and sufficient information that will allow proper identification of any named individual):
>
> _____

For entities that contract or seek to contract with the District for the sale or purchase of property, goods, or services:

> Identify each and every full-time District employee (and any member of the employee's family) who serves as an officer or director of the entity, or holds an ownership interest of 10 per cent or more in the entity (please include name and sufficient information that will allow proper identification of any named individual):
>
> _____

If more space is required please attach a second page. If the answer to any question is none, or not applicable, please write "None" or "Not Applicable" in the space reserved for that answer.

"I certify that the answers contained in this questionnaire are true and correct."

Individual:_____ Date:_____

Entity:_____

By:_____ Date:_____
Signature

Title:_____

Certified this _____ day of _____ , 20_____, by _____
Notary Public

_____
Notary Seal

DALLAS INDEPENDENT SCHOOL DISTRICT | Small Business Office

www.dallasisd.org/sbo | 972.925.4140

Construction | Competitive Sealed Proposals (CSP)
Small Business Office Compliance Guidelines and Forms

The information gathered from these forms will be used as part of the Small Business Office evaluation process.
Please visit our website at www.dallasisd.org/sbo for a fillable version of these forms.

To be completed and signed by the Prime Vendor			
Bid Title:		**Bid/RFP Number:**	
School:	**Org. Number:**	**Bid Package Total:**	**$**
Description of Work:			

Company Information			
Company Name:		**Tax ID#:**	
Is your company a Certified Minority or Woman Owned Business (M/WBE)?	☐ **Yes** ☐ **No**	If "**Yes**," include your current certification, ethnicity and gender information below. Dallas ISD recognized M/WBE Certification Agencies: Refer to Section 14 on Page 10. If "**No**," indicate your ethnicity & gender below.	

Certification Information			
M/WBE Certification Agency	**M/WBE Certification Number**	**Ethnicity**	**Gender**

Authorized Agent's Information			
***Authorized Agent's Name:**			
Authorized Agent's Email:		**Phone:**	
Company Address:			
City:		**State:**	**Zip:**

***** *Authorized Agent is a person who has the authority to enter into a legal binding contract with Dallas ISD.*

Required Signature. The undersigned authorized agent agrees that he/she has read and understands the Small Business Office Compliance Guidelines and Forms and that all information is correct to the best of his/her knowledge.

Authorized Agent's Signature (Please sign below)	Date:
X	

Company Name:_____ **Bid/RFP No.:** _____

Section 1. M/WBE Compliance Reporting

The Small Business Office has adopted the usage of B2G Now, a Diversity Management and Contract Compliance System, to assist with the management of the monthly compliance reporting requirement. Indicate the person who is knowledgeable about M/WBE utilization on this project below.

M/WBE Contact Person:	
Email:	
Phone:	

Section 2. Diversity Plans

Does your company have an Affirmative Action, Equal Employment Opportunity or Supplier Diversity Plan?

☐ **Yes**. If "**Yes**," attach a copy of your plan immediately following the Small Business Office forms.

☐ **No.**

Section 3. Workforce Composition

Employee Category	African American		Asian		Hispanic		Native American		Non-Minority			Total Employees	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female		Male	Female
Executive & Managerial													
Technical & Skilled													
Office & Clerical													
Other													
TOTAL													

Section 4. M/WBE References

List 2 M/WBE companies that have performed work for your company.

Company Name:	
Contact Person:	
Email:	
Phone Number:	
Project Name:	

Company Name:	
Contact Person:	
Email:	
Phone Number:	
Project Name:	

Company Name:_____ **Bid/RFP No.:** _____

Section 5. Mentor Protégé Program

Does your company currently participate in a Mentor Protégé Program as a mentor to an M/WBE company?
Refer to Section 20 on Page 13 for additional information.

☐ **Yes.** If **"Yes,"** attach a signed, dated and notarized copy of the Mentor Protégé Agreement and notarized minutes.

☐ **No.**

Section 6. Prime-Subcontractor Team

Is your company bidding as a Prime-Subcontractor Team with a certified M/WBE company?
Refer to Section 17 on Page 11 for additional information.

☐ **Yes.** If "**Yes**," identify the certified M/WBE company below. Attach a signed, dated and notarized Prime-Subcontractor Teaming Agreement.

☐ **No.**

M/WBE Company	M/WBE Certification Agency	M/WBE Certification Number	Ethnicity/Gender

Section 7. Joint Venture (JV)

Is your company bidding as a Joint Venture (JV) with a certified M/WBE company?
Refer to Section 18 on Page 12 for additional information.

☐ **Yes.** If "**Yes**," identify all partners (including your company*) below and attach a signed, dated, and notarized Dallas ISD Master JV Agreement. Each JV partner (excluding your company) must complete Sections A through E on Page 4.

☐ **No.**

Joint Venture Majority Partner*	
Company:	Contact Person:
Email:	Phone:
JV % Split:	

Joint Venture Partner		
Company:	Contact Person:	
Email:	Phone:	
M/WBE Certification Agency:		
M/WBE Certification Number:		
Ethnicity:	Gender:	JV % Split:

Company Name:_____ **Bid/RFP No.:** _____

COMPLETE SECTIONS A THROUGH E FOR EACH JOINT VENTURE PARTNER(S). USE ONE PAGE PER PARTNER

Section A. Diversity Plans

Does your company have an Affirmative Action, Equal Employment Opportunity or Supplier Diversity Plans?

☐ **Yes.** If "**Yes**," attach a copy of your plan immediately following the M/WBE Compliance Guidelines & Forms.

☐ **No.**

Section B. Workforce Composition

Employee Category	African American		Asian		Hispanic		Native American		Non-Minority			Total Employees	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female		Male	Female
Executive & Managerial													
Technical & Skilled													
Office & Clerical													
Other													
TOTAL													

Section C. M/WBE References

List 2 M/WBE companies that have performed work for your company.

Company Name:	
Contact Person:	
Email:	
Phone Number:	
Project Name:	

Company Name:	
Contact Person:	
Email:	
Phone Number:	
Project Name:	

Section D. Mentor Protégé Program

Does your company currently participate in a Mentor Protégé Program, as a mentor to an M/WBE company?
Refer to Section 20 on Page 13 for additional information.

☐ **Yes.** If **"Yes,"** attach a signed, dated and notarized copy of the Mentor Protégé Agreement and notarized minutes.

☐ **No.**

Company Name: _____ **Bid/RFP No.:** _____

Section 8. Subcontractor and Prime Self-Performance Participation

Will you use any subcontractors, sub consultants, suppliers (M/WBE and/or Non-M/WBE) as part of this bid/proposal?

☐ **Yes**. I plan to utilize subcontractors as part of this bid/proposal. Complete Section 10 below.

☐ **No.**

Will you self-perform the entire scope of work?

☐ **Yes.** I plan to self-perform the entire scope of work with my own workforce. If you are a Certified M/WBE Prime complete Section 9 below.

☐ **No.**

Section 9. Certified M/WBE Prime Self-Performance

Certified M/WBE Prime Self-Performance

Complete the Certified M/WBE Prime Self-Performance chart below, if you are a Certified M/WBE Prime and will self-perform with your own workforce the management of the project. The work should be consistent with industry standards. The M/WBE Prime's self-performance of a specialty trade or project scope of work shall be counted toward the goal, up to a maximum of 50% of the M/WBE project goal. Refer to Section 15 on Page 10 for additional information.

Certified M/WBE Prime Self-Performance			
Certified M/WBE Prime Company's Name:		Contract Amount	M/WBE %
Contact Person:			
Ethnicity:	Gender:		
Scope of Work:			

Section 10. Subcontractor Utilization

List all (minority and non-minority) subcontractors, suppliers, sub consultants, or sole proprietors that will be utilized in this bid/proposal. Only Certified M/WBE Prime Self-Performance and Certified M/WBE Subcontractors will be counted towards the M/WBE goals. If you will not utilize M/WBE subcontractors, complete Section 11 on Page 7.
For information on the change of subcontractor policy refer to Section 16 on Page 11.

Non-certified companies will not be counted towards the M/WBE goal.

Subcontractor/Supplier Information			
Subcontractor/Supplier Company's Name:		Contract Amount	M/WBE %
Address: City: State: Zip:			
Contact Person:			
Ethnicity:	Gender:		
Phone:	Email:		
M/WBE Certification Agency:	Certification #:		
Scope of Work:			

If you have additional Subcontractors/Suppliers include the total on the second page.

Company Name:_____ **Bid/RFP No.:** _____

Subcontractor/Supplier Information Continued

Subcontractor/Supplier Company's Name:				Contract Amount	M/WBE %
Address:	City:	State:	Zip:		
Contact Person:					
Ethnicity:		Gender:			
Phone:		Email:			
M/WBE Certification Agency:		Certification #:			
Scope of Work:					

Subcontractor/Supplier Company's Name:				Contract Amount	M/WBE %
Address:	City:	State:	Zip:		
Contact Person:					
Ethnicity:		Gender:			
Phone:		Email:			
M/WBE Certification Agency:		Certification #:			
Scope of Work:					

Subcontractor/Supplier Company's Name:				Contract Amount	M/WBE %
Address:	City:	State:	Zip:		
Contact Person:					
Ethnicity:		Gender:			
Phone:		Email:			
M/WBE Certification Agency:		Certification #:			
Scope of Work:					

Subcontractor/Supplier Company's Name:				Contract Amount	M/WBE %
Address:	City:	State:	Zip:		
Contact Person:					
Ethnicity:		Gender:			
Phone:		Email:			
M/WBE Certification Agency:		Certification #:			
Scope of Work:					

Subcontractor/Supplier Company's Name:				Contract Amount	M/WBE %
Address:	City:	State:	Zip:		
Contact Person:					
Ethnicity:		Gender:			
Phone:		Email:			
M/WBE Certification Agency:		Certification #:			
Scope of Work:					
			Total:		

If you have additional subcontractors/suppliers please make copies of this form.

M/WBE Use Only			
Contract Amount	**M/WBE Contract Total**	**M/WBE Percentage**	**M/WBE Coordinator**

Company Name:_____ **Bid/RFP No.:** _____

Certified M/WBE Subcontractor Performance. The M/WBE subcontractors, suppliers, and/or vendors must be 1st, 2nd or 3rd tier subcontractors, suppliers, and/or vendors when calculating participation. In order to prevent double counting, the district will count the M/WBE subcontractor participation for the 1st tier firm. If the 1st tier isn't a certified M/WBE, the district will count the 2nd tier M/WBE subcontractor. If the 1st and 2nd tier aren't certified M/WBEs, the district will count the 3rd tier M/WBE subcontractor. The expenditures by M/WBEs for materials or supplies toward M/WBE goals are calculated as follows:

	Type	M/WBE Percentage	Definition
A.	M/WBE Manufacturer	100%	Operates or maintains a factory or establishment that produces on the premises; the materials, supplies, articles, or equipment required under the contract.
B.	M/WBE Regular Dealer	60%	Owns, operates, or maintains a store, warehouse, in which the materials, supplies, articles or equipment are kept in stock, and regularly sold or leased to the public.
C.	M/WBE Representatives	Amount of Commission or Fees	Packagers, brokers, manufacturers' representatives

Section 11. Good Faith Effort

All district prime vendors are required to demonstrate positive and reasonable good faith efforts to subcontract with M/WBEs.
Complete this section if only non-M/WBE subcontractors will be utilized.

	Yes	No
1. Was contact made with M/WBEs by telephone or written correspondence at least one week before the bid was due to determine whether any M/WBEs were interested in subcontracting and/or joint ventures?	☐	☐
2. Were contracts broken down to provide opportunities for subcontracting?	☐	☐
3. Was your company represented at a pre-bid/proposal conference to discuss, among other matters, M/WBE participation opportunities and obtain a list (not more than two months old) of certified M/WBEs?	☐	☐
4. Was information provided to M/WBEs including, but not limited to bonding, lines of credit, technical assistance, insurance, scope of work, plans/specifications?	☐	☐
5. Were subcontracting opportunities advertised in general circulation, trade associations, M/WBE focused media and/or minority chambers of commerce?	☐	☐
6. Did you encourage non-certified M/WBEs to pursue certification status?	☐	☐
7. Were negotiations conducted in good faith with interested M/WBEs?	☐	☐
8. Were the services utilized of available minority and women, community organizations, contractor groups, local, state, and federal business assistance offices, and other organizations that provide assistance in the identification of M/WBEs?	☐	☐

Special Note: The good faith efforts documentation is subject to a Small Business Office audit. Upon request, you will be required to provide supporting documentation for the purpose of verifying your good faith efforts.

Company Name:_____ **Bid/RFP No.:** _____

Section 12. Letter of Intent (LOI) [Not required with the initial bid/proposal]

To be submitted at the contract negotiation meeting with the district, or as requested by the Small Business Office. Complete one LOI form for each proposed M/WBE subcontractor. Refer to Section 14 on Page 10 for additional information.

Org/School:_____

Prime vendors must submit a Letter of Intent for each M/WBE Subcontractor who will be utilized to supply any services, labor or materials pursuant to the bid/proposal. If necessary, make copies.

This Letter of Intent is submitted to confirm the intent of the prime vendor and subcontractor to conduct good faith negotiations toward a subcontract agreement, with terms agreeable to both parties, for the scope of work identified herein. The parties acknowledge that any obligation of the prime vendor to enter into a subcontract agreement with subcontractor is expressly contingent upon the prime vendor entering into a contract with Dallas ISD for the work as defined in the bid/proposal.

This document must be completed in its entirety by the Prime Vendor and signed by both the Prime vendor and the M/WBE Subcontractor.

Any false statements or misrepresentations regarding information submitted on this form may be a criminal offense in violation of Section 37.10 of the Texas Penal Code.

A. M/WBE Subcontractor's Information:

The M/WBE subcontractor _____ has been certified by a Dallas ISD recognized certification agency.

Name of Certifying Agency: _____ Certification #: _____ Ethnicity/Gender: _____
Print or Type Certification Agency's Name

Pursuant to district policy (CH Local), only M/WBEs who are currently certified with one of the Dallas ISD recognized certifying agencies (see Section 14 on Page 10 for listing) may be counted towards meeting the district's M/WBE goal at the subcontracting level.

The M/WBE Subcontractor is prepared to perform the following services, labor, or materials listed in connection with the project:

Scope of Work: _____

Price: $ _____

M/WBE Subcontractor Signature Required
Review the above information for accuracy prior to signing this Letter of Intent.

x

Print or Type Name and Title of M/WBE Owner, President or Authorized Agent	Signature	Date

B. Prime Vendor's Information:

Contact Person: _____ Company Name: _____

Address, City, State & Zip: _____

Declaration of Prime Vendor/Declarant:

I _____ HEREBY DECLARE AND AFFIRM that I am the _____
Name of Declarant (Print or Type) Title of Declarant (Print or Type)

and am duly authorized to make this declaration on behalf of _____
Company Name (Print or Type)

and that I have personally reviewed this Letter of Intent. To the best of my knowledge, information and belief, the facts and representations contained in this form are true and correct. The owner, president or authorized agent of the M/WBE firm signed this form, and no material facts have been omitted.

Prime Vendor/Declarant Signature Required
Review the above information for accuracy prior to signing this Letter of Intent.

x

Print or Type Name	Signature	Date

General Information regarding the Small Business Office Compliance Guidelines and Forms

The district's aspirational M/WBE goal is **30%** for goods, services, and construction contracts. The district's aspirational M/WBE goal for bond funded professional service contracts is **35%**. The district may assign a contract specific M/WBE goal in lieu of the aspirational goal. Review your solicitation documents to determine which M/WBE goal will apply. The established M/WBE goal is applicable to any change orders, additional services, modifications or revisions to the original contract. It's the contractors' responsibility to be aware and in compliance with all local, state and federal regulations and requirements related to M/WBE programs.

Section 13. During Bid/Proposal Submission

Small Business Office Forms. Submit the completed, signed, and dated Small Business Office Compliance Guidelines & Forms by the due date. Include all M/WBE supporting documentation including, but not limited to M/WBE Certificates, Affirmative Action, Equal Employment Opportunity or Supplier Diversity Plan, signed, dated and notarized Joint Venture Agreement, signed, dated and notarized Mentor Protégé Agreement and Minutes or Prime-Subcontractor Teaming Agreement. Each proposal will be evaluated independently against other proposals.

Small Business Office Scoring Criteria. The district's Small Business Office Evaluation Scoring Criteria has been established as follows:

	Small Business Office Scoring Criteria	Maximum Point Allocation
A.	Proposer demonstrated a commitment to the district's Small Business Office program by providing enhancements to the administration of the proposer's contracting process for the work to be done by M/WBE firms. *Examples of this commitment may include any of the following: expedited payments, Mentor Protégé Programs, early release of retainage, expanding the pool of diverse subcontractors to firms that have not done business with the district, etc.*	3
B.	Proposer submitted a list of 2 M/WBE subcontractor references.	2
C.	Proposer is a certified M/WBE **OR** Proposer submitted a Joint Venture Agreement with a certified M/WBE **OR** Proposer submitted a Prime Subcontractor Teaming Agreement with a certified M/WBE.	5
D.	Proposer submitted a diverse list of certified M/WBE subcontractors, subconsultants or suppliers that meets or exceeds the district's M/WBE aspirational goal in meaningful and significant roles **OR** Proposer demonstrated outreach designed to meet the M/WBE project goals with a diverse M/WBE team of subcontractors, suppliers and subconsultants.	5
E.	Proposer demonstrated a comprehensive framework and understanding of the district's Small Business Office program by: meeting the M/WBE commitment, designating a high ranking individual who will be responsible for M/WBE contract compliance, monitoring and reporting, ensuring no unauthorized changes to M/WBE subcontractors, adhering to subcontractor payment terms, executing the M/WBE subcontracting schedule, complying with the district's M/WBE Program Guidelines.	5
	Total Points	**20**

Subcontractor Utilization. Complete Section I0 on Page 5 for the subcontractors you plan to utilize. Attach a copy of the current M/WBE certificate or proof of M/WBE certification for each M/WBE subcontractor. Contact the M/WBE Department if you would like a listing of certified M/WBE subcontractors or suppliers.

Section 14. Recognized Certifying Agencies

The district accepts M/WBE certifications issued by:

North Central Texas Regional Certification Agency (NCTRCA)
D/FW Minority Supplier Development Council (DFW MSDC)
Department of Transportation (DOT)
City of Houston
City of Austin
National Minority Supplier Development Council (NMSDC)
State of Texas' Historically Underutilized Business (HUB)
Women's Business Council Southwest (WBC SW)
South Central Texas Regional Certification Agency (SCTRCA)
Corpus Christi Regional Transportation Authority
Small Business Administration (8A or certified SDB)
National Women's Business Enterprise Certification (WBENC)

Other certifications may be considered on an individual basis. Only certified disadvantaged, minority and women-owned companies will be counted towards the prime's M/WBE subcontracting goals. Vendors do not have to be a certified M/WBE to participate in the district's contracting and purchasing activities.

Section 15. Certified M/WBE Prime Self-Performance

- The M/WBE prime must be a bona fide business with real and continuing ownership for more than a year prior to the solicitation and was not created merely for the purpose of meeting this evaluation criteria.
- The M/WBE prime must be certified at the time of submission of the proposal.
- The M/WBE prime must be economically independent and perform commercially useful functions and must perform the management of the project or the specialty trade work, consistent with industry practices, with its own workforce.
- The M/WBE's self-performance of a specialty trade or project scope of work shall be counted toward the goal up to a maximum of 50% of the M/WBE project goal.

  For example, an M/WBE prime elects to self-perform the interior finish out painting which equals 10% of the project's total costs and the goal for the project is 30%. The M/WBE prime's participation will count 10% toward the M/WBE project goal of 30%. The remaining M/WBE subcontracting goal after applying the MWBE prime's self-performance on the project is a 20% M/WBE subcontracting goal.

- If the M/WBE prime's self- performance exceeds the M/WBE contract goal, a maximum of 50% of the M/WBE project goal will be applied toward the goal.

  For example, the M/WBE prime self-performs the concrete work for the project and the concrete work is 30% of the total project costs. The MWBE prime's participation will count 15% toward the M/WBE project goal of 30%. The remaining M/WBE subcontracting goal after applying the M/WBE prime's self- performance on the project is a 15% MWBE subcontracting goal.

Section 16. After Bid/RFP Submission

Letter of Intent. The awarded prime vendor who will subcontract portions of the work should complete the *Letter of Intent to Perform/Contract as an M/WBE Subcontractor* form (Section 12 on Page 8) for each proposed M/WBE subcontractor. The prime vendor will be required to provide the *Letter of Intent to Perform/Contract as an M/WBE Subcontractor* form at the contract negotiation meeting with the district, or as requested by the Small Business Office.

Changes to the List of Subcontractors. A Request for Approval of Contract Change form must be submitted to the Small Business Office for approval prior to any changes to the M/WBE subcontractor utilization listing in Section 10 on Page 5. A written justification and supporting documentation are required from the prime requesting the change. This applies after Bid/RFP submission and throughout the contract duration.

Subcontractor Payment. The Prime vendor shall submit an M/WBE Pay Activity Report (PAR) indicating the amounts paid (along with required proof of payments) to its subcontractors with each pay application or as requested by the district.

- Acceptable proof of payments includes: (1) Emails from the Subcontractor verifying the payment amount, date paid, school name and/or org #, and project information (2) Partial Lien Releases, (3) Cancelled Checks, or (4) Proof of Electronic Funds Transfer;
- All Prime vendors must pay all submitted invoices, including retainage to subcontractors, suppliers, or entities within **10 days** of receiving payment from the district;
- No Prime vendor shall withhold a non-disputed subcontractor payment;
- No Prime vendor may withhold retainage greater than 5% from the subcontractor.

Contract Execution between Prime Vendor and Subcontractor. Prime vendor agrees to establish a written contract with each subcontractor. At minimum, the contract should include the scope of work, payment terms, prompt payment clause and retainage clause.

Changes to the original M/WBE Commitment – After Contract Execution. The prime vendor shall notify the Small Business Office if the percentage of M/WBE participation falls below the level of participation represented in the contract. The prime vendor shall promptly notify the Small Business Office within 7 days and obtain a listing of other certified M/WBE vendors to meet the commitment amount.

Records Retention. The prime vendor will be required to maintain records showing the subcontractor/supplier awarded contracts, subcontractor payment history, efforts to identify and award contracts to M/WBEs, and copies of executed contracts with M/WBEs. The contractor must provide access to books, records and accounts to authorized district, state and federal officials for the purpose of verifying M/WBE participation and good faith efforts. District contracts are subject to an M/WBE audit.

Section 17. Prime-Subcontractor Teaming Agreement

The Prime-Subcontractor Teaming Agreement will be evaluated based upon the below referenced criteria. The designated subcontractor in this agreement must be a certified M/WBE. There is a maximum of 5 numerical points available.

Proposer submitted a teaming arrangement and/or strategic partnership with subprime contracting with a certified MWBE firm(s). The certified MWBE firm(s) provides prime management, control and supervision of a clear and distinct portion of the specialty trade(s) or project scope of work in a meaningful and significant role(s). Proposer will establish a teaming agreement which defines the minimum M/WBE subcontractor commitment. The teaming agreement defines what trade(s) the subcontractor will perform and the subcontractor is certified in the respective subcontracting scope.

	Teaming Agreement Scoring Analysis	Located on Page	Available Points
A.	The teaming agreement provides the certified M/WBE firm(s) with prime management, control and supervision of a clear and distinct portion of the project scope of work in meaningful and significant roles.		2.00
B.	A pre-negotiated subcontract form is an exhibit to the teaming agreement.		1.00
C.	The teaming agreement contains a dispute resolution procedure.		0.50
D.	The teaming agreement only terminates upon owner non-select or owner non-award.		0.50
E.	The teaming agreement requires subcontract award to the M/WBE partner identified in the teaming agreement.		1.00
	Total		**5.00**

Section 18. Joint Venture Program Information

The objective of the district's Joint Venture (JV) Program is to further the development, growth, and capabilities of minority and women-owned businesses that allow such businesses to offer the district the best combination of performance, cost, and delivery of service. A JV is an association of 2 or more companies with a certified minority or woman-owned business to form a new company. The Joint Venture parties are required to utilize the Dallas ISD's Master Joint Venture Agreement. The agreement must be signed, dated and notarized by all Joint Venture parties. The Joint Venture does not replace a prime contractor's responsibility to satisfy applicable Small Business Office requirements, including M/WBE goals. Failure to adhere to the terms and conditions outlined within the Dallas ISD Joint Venture agreement may deem your Joint Venture response as non-responsive and result in a non-point award during evaluation.

Companies seeking to participate in a Joint Venture arrangement has the burden of demonstrating to the district, by a preponderance of the evidence, that it meets the requirements of Board Policy (CH) Local with respect to being an eligible Joint Venture for counting purposes. The district will analyze whether the stated Joint Venture is realistic considering the number of employees, experience, resources, certification type, and other resources that each party provides to the Joint Venture. The Joint Venture Partnership must include a certified M/WBE Partner, based on the percentage allocated, who is able to adequately bond the project, have the experience and resource to perform the services, labor or material listed.

The Joint Venture Partner(s) may provide co-surety bond or bonds in proportionate percentage to their ownership in the Joint Venture and to other parties are applicable in a form acceptable to the owner. The Joint Venture may also provide in a form acceptable to the owner any bond or bonds in the name of the Joint Venture in lieu of the co-surety arrangement; provide an Up-Front Joint Agreement (SAA Form #1), and an executed copy of the indemnity agreement signed by all of the parties associated with the SAA Form #1.

A separate bank account in the name of the Joint Venture must be established by the Joint Venture. The bank account will require the signature of an authorized representative of each party or his or her designee for withdrawal by check or documented approval of an authorized representative for withdrawal by electronic means.

Refer to the district's website at www.dallasisd.org/sbo for the required Dallas ISD's Master Joint Venture Agreement and Joint Venture Guidelines.

Section 19. Construction M/WBE Joint Venture Scoring Analysis

The Joint Venture (JV) Agreement will be evaluated based upon the below referenced criteria. One of the JV partners must be a certified minority or woman-owned business. There is a maximum of 5 numerical points available. Refer to Section 18 on Page 12 for additional information.

The proposer must submit an approved, signed, dated, and notarized Dallas ISD Master Joint Venture Agreement. Any modifications to the Dallas ISD Master Joint Venture Agreement and amendments must be submitted for review with the proposal and include highlighted proposed changes or modifications to the agreement for review and approval of Dallas ISD's Small Business Office.

A.	**M/WBE Joint Venture Partner**	**Points**
Does it identify the distinct, clearly defined portion of the work provided by each M/WBE joint venture partner, in significant and meaningful ways? The work must be separate, clear and distinguishable. Specify the nature of the work and what it will entail. Complete exhibit A of the Dallas ISD Master Joint Venture Agreement.		3.00
B.	**Staffing Plan**	
Does it provide a staffing plan to be determined per the established participation percentages indicating the number of employees to be provided by each M/WBE joint venture partner? This should include a project organizational chart and a resumé for each key personnel that includes length of employment, time serviced in their role(s), and experience within the industry. Complete exhibit B of the Dallas ISD Master Joint Venture Agreement.		1.00
C.	**Financial and Bonding Information**	
Does it provide a letter from a financial institution or bonding surety company, substantiating the financial strength or bonding capacity of each M/WBE joint venture partner(s)? This document should commensurate each M/WBE joint venture partner(s) percentage split. Complete exhibit C of the Dallas ISD Master Joint Venture Agreement.		1.00
Total Points		**5.00**

Section 20. Mentor Protégé Program Information

The Small Business Office Mentor-Protégé program aims to stimulate the growth of minority and women-owned businesses through education, business development, and training. A mentor should be willing to advise and support the Protégé and help identify the needs and skills of the Protégé. Mentor Protégé Agreement, meeting minutes, progress reports, and deliverables should be signed by all parties, dated, and notarized.

JOINT VENTURE AGREEMENT

BY AND BETWEEN

_____

AND

_____

AS

_____, a Joint Venture JV

FOR

Dallas Independent School District

_____

JOINT VENTURE AGREEMENT

THIS AGREEMENT is made and entered into this _____ day of _____, 20___ (the "Effective Date"), by and between _____Inc. ("NAME"), a _____ ("STATE") corporation, whose business address is _____ ,_____ ("CITY") , _____ ("STATE") _____ ("ZIP"); and _____, Inc. ("NAME"), a _____ ("STATE") corporation, whose business address is_____, _____ ("CITY") , _____ ("STATE") _____ ("ZIP"), hereinafter referred to individually as a "Party" or collectively as the "Parties". The name of the Joint Venture shall be called _____. All business of the Joint Venture shall be conducted under this name.

Recitals

A. The Parties have agreed to enter into a joint venture for the purpose of submitting a proposal, bid, solicitation or otherwise (the "Proposal") to provide owners representative services or work to the Dallas Independent School District in response to Bid/RFP/RFQ No. _____ entitled _____ (the "Solicitation"), which to the extent the Proposal is successful, will result in a contract with the Owner.

B. The Parties desire to enter into this Agreement to fix and define between themselves their respective interests and responsibilities for the purposes of providing the requisite Services, Work, or both.

C. The Parties affirm and agree that they shall participate in the preparation of the Proposal and pursue the Contract with each other, that no Party shall submit a competitive proposal or otherwise seek the award of the Contract contemplated herein either alone or with others without notice to the Parties to this Agreement and entering into a Non-Disclosure Agreement, and in reliance thereon have entered into this Agreement.

D. The Parties agree and affirm to register the Joint Venture with the State and forward the Certificate of Filing and Tax Identification Number to the Dallas Independent School District, if the Joint Venture is awarded a Project with the Owner.

E. The Parties affirm and agree the joint venture participation split represented in this Agreement and no employee or former employee [of less than one year], relative, affiliate or subsidiary company is listed or included as a joint venture partner.

F. In the event the Parties agree to pursue other DISD projects as a joint venture, they will enter into an addendum to this Agreement, subject to District approval, identifying that project and any modified terms of this Agreement, if any, in connection with the pursuit or award of same.

NOW, THEREFORE, in consideration of the mutual covenants contained herein, it is agreed as follows:

Agreement

Article 1: Definitions and Interpretation

1.1 Capitalized terms used in this Agreement shall have the meaning set forth below or as defined elsewhere in this Agreement.

1.1.1 "Agreement" means this document.

1.2

1.2.1 "Managing Business Party" the Joint venture partner designated to provide the accounting and financial services, on behalf of the Joint Venture required to reflect the conduct of the Joint Venture's affairs

1.2.2 "Owner" means Dallas Independent School District.

1.2.3 "Contract" means any contract (together with any amendments, supplements or modifications thereto) awarded to the Joint Venture by the Owner for the performance of the Services, Work, or both, for the Project

1.2.4 "Deputy Project Manager" means the individual specifically designated pursuant to Article 3 of and charged with assisting the Project manager and Senior Project manager in the overall responsibility to direct the Joint Venture's performance under the Contract.

1.2.5 "IRC" means the Internal Revenue Code of 1986 as amended as of the date of this contract.

1.2.6 "Joint Venture" means an association between _____, Inc., and _____, Inc. engaged in a solitary business enterprise for profit.

1.2.7 "Management Committee" means the group formed pursuant to Article 4 as the final authority of the Joint Venture and having the powers and duties as provided herein.

1.2.8 "Project" means the "DALLAS ISD" Construction" project the subject of the solicitation.

1.2.9 "Project Manager" or "Senior Project Manager" means the individual specifically designated pursuant to Article 3 of and charged with overall responsibility to direct the Joint Venture's performance under the Contract.

1.2.10 "Proposal" means the proposal(s) submitted by the Joint Venture to the Owner to secure the award of the Contract for the Project. The Proposal shall include, but not limited to, all pursuit efforts, including any presentation or other interview. The term "Proposal" does not include task order specific proposals.

1.2.11 "Services" or "Work" means services or work under the Contract to be performed by the Joint Venture in furtherance of the Project.

1.2.12 "Task Order Contract" means a contract for services that does not procure or specify a firm quantity of services (other than a minimum or maximum quantity) and that provides for the issuance of orders for the performance of tasks during the period of the contract. 1.2. Terms importing the singular include the plural and vice versa where the context requires.

1.3. The headings used in this Agreement are included for ease of reference only and shall not affect the construction or interpretation hereof.

Article 2: Association of the Parties

2.1 Formation. The Parties hereby agree to form the Joint Venture pursuant to the provisions hereof for the limited purpose and scope set forth in this Agreement. The Parties hereby further agree to perform the Joint Venture's responsibilities and obligations as an integrated team, providing staffing (including key

personnel) and resources generally in proportion to their respective interests in the Joint Venture as set forth in Article 5.

2.2 Purpose. This Joint Venture is entered into solely for the purpose of submitting the Proposal and, if the Contract is awarded to the Joint Venture, the performance of the Services, Work, or both, as identified in the Solicitation. The Parties agree that the Joint Venture is a temporary association and that it will not place any limitation or liability on the Parties beyond the specific undertakings contained in this Agreement.

2.3 Name. The Joint Venture shall operate under the name _____, a Joint Venture.

2.4 Duration. The Joint Venture will continue until dissolved in accordance with this Agreement. Subject to the foregoing, the Joint Venture shall:

2.4.1 dissolve automatically (i) should the Parties fail to agree as to the form, terms or conditions of the Proposal, (ii) if the Project is cancelled prior to award, or (iii) if the Contract is not awarded to the Joint Venture, but only after any challenge to the award of the Contract, by administrative protest or litigation (or appeal of a decision on such protest or litigation), is fully concluded without an award of the Contract to the Joint Venture, or

2.4.2 if awarded the Contract, be dissolved upon completion of all Services, Work, or both, required to be performed under the Contract, receipt of full payment of all sums for which the Joint Venture is entitled under the Contract, the settlement of all disputes and final accounting, and the expiration of all warranties and all other obligations arising in connection with the Contract.

2.43 if awarded the Contract, the Joint Venture shall not be dissolved, without thirty (30) days written notice and the prior written consent of the Dallas Independent School District

2.5 In the event the Contract is terminated, the Joint Venture shall conclude its affairs in an orderly manner at the earliest practicable date, subject to the requirements of Section 2.4 above. However, should the Services, Work, or both, be only suspended, the Joint Venture shall remain in effect during the period of such suspension.

2.6 The Parties agree that they shall cause the Joint Venture to sign the Contract promptly upon its being tendered for signature in a form mutually agreed upon by the Parties and the Owner.

2.7 Scope of Services or Work. The Services, Work, or both, to be performed by the Joint Venture shall generally be of the type and nature described in Exhibit A.

Article 3: Operation of the Joint Venture

3.1 If required by applicable law or regulation, the Joint Venture shall be registered and licensed as a business in the jurisdiction where the Joint Venture's principal office is located.

3.2 The principal business address of the Joint Venture shall be _____. Services may be performed in the Owner's offices, in the Joint Venture office, in the respective offices of the Parties or DALLAS ISD as authorized, at the project site or at such locations as the Parties may mutually agree upon.

3.3 All correspondence from the Owner regarding the Contract shall be sent to the Project Manager and/or _____ at the principal business address of the Joint Venture, with a copy provided to each of the Joint Venture members.

3.4 Initial Proposal Effort. Each Party will participate in preparing the Proposal required for the Contract under the direction of the Project Manager. Each Party will bear its own labor and travel costs associated

with this effort. Third party direct costs for expenses and other services such as video imaging, photography, document development, technical writing and editing, graphics, printing, and reproduction, as well as any specialty sub-consultant services, shall be shared between the Parties in proportion to each Party's Agreed Percentage of Participation as specified in Article 5; provided, however, that all Parties must pre-authorize any such expenditure.

3.5 Integrated Services. During the construction and pre-construction phase of the project, the Parties intend to perform the Services as an integrated organization with each Party providing competent personnel to the Joint Venture consistent with the staffing resource plan set forth in Exhibit B and as necessary to enable the Joint Venture to successfully perform the Services, Work, or both, in accordance with the terms of the Contract. In addition, and at the direction of the Management Committee, Services may be performed, in whole or in part, by consultants retained by the Joint Venture, one or more of the Parties, or both, and Work may be performed, in whole or in part, by subcontractors retained by the Joint Venture, one or more of the Parties, or both. Notwithstanding the foregoing, personnel assigned to the Joint Venture shall remain on the payroll of the assigning Party. The staffing resource plan may be amended from time to time as may be deemed necessary by the Management Committee. A Party may not remove from the Project or reassign to another project any "key personnel" listed on Exhibit B without the prior consent of the Management Committee and notice to the Director of the MWBE Department or his/her designee within five (5) business days from the date of removal or reassignment.

3.6 Subject to the limitation noted above with respect to key personnel, in the event that an individual assigned to the Project is unable or unwilling to perform the Services, the Work, or both, in a professional and timely manner, or if the Owner directs the Joint Venture to remove a particular individual from the Project, or if the Project Manager, in the good faith exercise of his/her discretion, determines that an individual should be removed from the Project, then the assigning Party shall replace such individual with a qualified employee reasonably acceptable to the Management Committee and, if applicable, the Owner. If the assigning Party cannot furnish a qualified substitute candidate within a reasonable period of time after the vacancy arises, then the vacancy shall be filled by an individual employed by the other Party.

3.7 Project Manager. Subject to the authority of the Management Committee and any limitations set forth herein, the Project Manager is the individual charged with responsibility to direct the Joint Venture's performance under the Contract. Subject to Owner approval (if required), _____ shall serve as the Project Manager during the term of the Contract, subject to the continuing approval of the Management Committee. If this individual, as determined by the Owner or the unanimous consent of the Management Committee, is unable to satisfactorily perform his duties as Project Manager, the Management Committee will nominate an employee of _____- to serve as the successor Project Manager. In performing his duties, the Project Manager shall treat both Parties fairly and shall not discriminate in favor of either Party.

3.8 In addition to the other duties set forth herein, the Project Manager is to:

3.8.1 Serve as the primary interface between the Joint Venture and the Owner;

3.8.2 Ensure compliance with the DALLAS ISD MWBE Program requirements

3.8.3 Submit Change Orders to the Owner;

3.8.4 Report monthly, or as requested, to the Management Committee;

3.8.5 Oversee the Services, Work, or both, of the Joint Venture;

3.8.6 Prepare and maintain Project schedules;

3.8.7 Consult and confer with the Deputy Project Manager; and

3.8.8 Perform such additional duties as directed by the Management Committee.

3.9 Deputy Project Manager. The Deputy Project Manager shall be designated by the MWBE partner and will support and assist the Project Manager in the performance of his/her duties as set forth above. Subject to Owner approval (if required), _____ shall serve as the Deputy Project Manager during the term of the Contract, subject to the continuing approval of the Management Committee. If this individual, as determined by the Owner or the unanimous consent of the Management Committee, is unable to satisfactorily perform his duties as Deputy Project
3.10 Manager, the Management Committee will nominate an employee of _____ MWBE Joint Venture Partner to serve as the successor Deputy Project Manager.

Article 4: Joint Venture Organization

4.1 _____ shall be responsible for the fiscal and administrative tasks of managing the business operations of the Joint Venture (the "Managing Business Party") and shall appoint an individual responsible for these tasks. As the Managing Business Party, _____will appoint one of its Management Committee Members to act in the role of Chairperson of the Management Committee commencing on the effective date of this Agreement.

4.2 The Project Management Committee ("Management Committee") will be comprised of two or three (___) representative from _____, and one (_) representative from _____. The Parties individual representatives designated to comprise the Management Committee are referred to herein as the primary representative(s). The Managing Business Party shall designate an individual on the Committee as the Chairperson to manage the administrative and management functions of the Committee. In addition to its primary representatives or representative, each Party shall also name an alternative representative for its primary representatives or representative. A Party's alternative representative shall act in the capacity of its primary representative should its primary representative be unable to fulfill his or her duties as described herein. If not identified below, representatives shall be designated within thirty (30) days of the date of this Agreement by written notice to the other Party. A Party may change its designated representative(s) or alternate representative upon ten (10) days written notice to the other Party. No proxies shall be permitted. Each Party's designated primary and alternate representative(s) shall have full power and authority to act for and on behalf of the Party so appointing them with respects to all matters coming before the Management Committee.

4.3 Meetings of the Management Committee shall not be held unless each Party is represented. If the Parties representatives are not all available, the meeting shall stand adjourned and will be re-scheduled to the next earliest date acceptable to all Parties. While the Management Committee will always attempt to meet in person, telephonic or online meetings shall be allowed. The Parties shall endeavor to provide five (5) days written notice to each Party of scheduled meetings (in person, online or by telephone), except in the event of an emergency or immediate need. A Party's refusal or repeated failure to attend any scheduled Management Committee meeting shall at the other Party's sole discretion, constitute of default under this Agreement subject to the review and approval of the MWBE Director or his/her designee.

4.4 _____ representative(s) shall each have one (1) vote on matters coming before the Management Committee. The primary representative(s) from _____shall each have one (1) vote each on matters coming before the Management Committee. A vote shall not be taken until each representative of a Party has communicated its position and expressed its questions, concerns, approval or disapproval of a matter. Each party agrees to work collaboratively to make decisions and solve problems in the best interest of the Joint Venture. In the event the Management Committee members cannot reach a unanimous decision on the business and operational matter(s) at hand requiring a Management Committee vote or resolution, the Chairperson will make the decision as majority partner, taking into account the risks and financial impacts to all parties and the Joint Venture. The final decision is applicable for all matters except for scope changes made by the Owner or settlement of claims and disputes. In these cases, if the Management Committee cannot develop a mutually agreeable solution, they shall submit any dispute to the Chief Executive Officer of the Joint Venture partners as provided for in Article 16. If, in the Project Manager's good faith judgment, immediate action is required in order to meet the Joint Venture's obligations under the Contract, the Project Manager may act without waiting for the resolution of the dispute,

subject to written notice and each Party's reservation of their respective right to seek recovery for the financial consequences arising from such action pending final resolution of the dispute. If any Party is in default (as defined in Article 12) under this Agreement, during the time of such default, its representative(s) shall not vote upon any issue, and such representative(s) shall not be included in the computation of eligible votes. Within one week of the Management Committee meeting, written meeting minutes regarding items discussed and actions taken at the meeting shall be prepared and distributed by the Chairperson of the Management Committee.

4.5 The Project Management Committee shall meet with the Project Manager or Senior Project Manager) and the Deputy Project Manager or Assistant Project Manager (and other project staff as mutually agreed upon by the Management Committee) quarterly or more frequently if deemed necessary.

4.6 The Project Manager shall have authority to conduct the business of the Joint Venture in accordance with the terms of this Agreement, but shall not have authority to, and shall not directly or indirectly without the unanimous consent and prior written approval of the Management Committee:

4.6.1. Enter into on behalf of the Joint Venture any third-party contractual arrangements or cause the Joint Venture to assume, incur, or become liable for any other obligations;

4.6.2. Make any investment in any other person or entity; make loans or guarantees, or otherwise extend or pledge credit to others;

4.6.3. Confess any judgment against the Joint Venture or compromise any debt due the Joint Venture except upon receipt of full payment;

4.6.4. Make any election for the Joint Venture under the then-current Internal Revenue Code, as amended, or any other applicable income tax legislation from time to time in force;

4.6.5 Commence any claim against the Owner with respect to amounts due under the Contract;

4.6.6 Commence any litigation; defend any action or claim against the Joint Venture by a third party; appeal any judgment or decision; or settle any litigation, action or claim to which the Joint Venture is a party;

4.6.7 Cause to be organized or acquired in whole or in part by the Joint Venture any corporation to carry out any activities of the Joint Venture; or

4.6.8 Exercise any of the authority vested in the Management Committee pursuant to Section 4.9 below.

4.7 In case it is necessary to settle a matter prior to the next scheduled or specially called meeting, the representatives may agree on a decision by notice to each other in accordance with the provisions of Article 23. Such decision will be included in the minutes of the next meeting of the Management Committee.

4.8 The representatives shall be deemed to be acting on behalf of his or her respective Party and no representative shall be liable to the Parties by reason of his or her actions as a member of the Management Committee, except where such representative's action constitutes gross negligence or actual fraudulent or dishonest conduct.

4.9 The Management Committee may delegate, in writing, such of its responsibilities and duties as it deems appropriate to the Project Manager, Senior Project Manager or the Managing Business Party, except that the Management Committee must act, *inter alia*, on the following matters of major consequence:

4.9.1 Timing and amount of distribution of Joint Venture profits and the Management Committee's right to demand additional cash reserves to cover potential losses;

4.9.2 Amount of revenue reserves, cash reserves, and contingent cost reserves to be retained by the Joint Venture;

4.9.3 Voluntary liquidation of the Joint Venture;

4.9.4 Third Party contractual arrangements or the incurring of other obligations in excess of $10,000 by or on behalf of the Joint Venture;

4.9.5 Designation of a successor Project Manager or Deputy Project Manager;

4.9.6 Resolution of a dispute first referred to the Management Committee pursuant to the provisions of Article 16;

4.9.7 Review and approve all contractual transactions between the Parties (and their affiliates) and the Joint Venture; and

4.9.8 Take such other action and exercise such other authority as the Management Committee deems necessary to cause the Joint Venture to achieve its purposes consistent with good business practices and in compliance with all applicable laws and regulations.

4.10 The Joint Venture shall not have employees. The Parties shall provide all necessary personnel. A Party, at its own cost and expense, may retain necessary staff on an independent consultant basis to meet its personnel needs.

Article 5: Interests of the Parties

5.1 Except to the extent that this Agreement expressly provides to the contrary, the interests of the Parties in (i) any and all gains, losses, and liabilities that may result from the performance of the Contract or the Agreement, or both, (ii) any and all property, equipment, and other assets acquired by the Joint Venture, and (iii) any and all monies received in connection with the Contract, shall be determined proportionately in accordance with the Party's Agreed Percentage of Participation as set forth below.

Agreed Percentage of Participation

_____ ____ _%

_____ _____ %

_____ _____ %

5.2 The Parties acknowledge and agree that all liabilities and risks associated with the Project shall be shared pro rata according to the Agreed Percentage of Participation unless otherwise provided for herein. The MWBE Joint Venture partners proportionate share in the ownership shall be commensurate with their capital contribution, control, management, risks and ownership interest. For the avoidance of doubt, a Party's profits and losses arising out of the performance of self-performed subcontracting services, work, or both, for which it is responsible under this Agreement shall not be considered profits and losses of the Joint Venture.

5.3 The Parties shall appoint a Project Manager or Senior Project Manager to maintain and oversee the day to day work under the Contract. The Parties shall jointly select any necessary additional Project Managers, the Assistant Project Manager (the "APM") and/or Superintendents. The selected Project Managers and Superintendents shall be available at the Project site daily to supervise the work under the Contract. The MWBE Joint Venture Partner shall be assigned staff under the Contract in proportionate share of their respective ownership interest in the Joint venture. The Project manager shall submit the final staffing matrix confirming compliance with this section including all Project managers, Assistant Project managers and Superintendents to DALLAS ISD's MWBE office within 30 days of the Notice to Proceed.

5.4 The clear and distinct portion of the Scope of Work to be performed by _____, the MWBE Joint Venture partner and the estimated value of those services commensurate with the percentage ownership interest is as follows:

A detailed delineation of the Joint Ventures duties is outlined in Exhibit "A".

[Please note that if the MWBE's scope of work is described as "participate in", "advise about", "assist in" or "consult", the work shall not be considered distinct or clearly defined for the purpose of analyzing the joint venture participation]

Article 6: Execution of Bonding and/or Guarantees

6.1 Each of the Parties agrees to execute all applications and indemnity agreements required by its sureties upon any bond or bonds required in connection with the Proposal and/or the Contract. Failure of a Party to execute any documentation necessary to effectuate the intent of this Article 6 shall constitute a default in accordance with Article 12 and entitle the non-Defaulting Party(ies) to appropriate relief as provided therein.

6.2 The Joint Venture partner(s) may provide co-surety bond or bonds in proportionate percentage to their ownership in the Joint Venture and to other Parties are applicable in a form acceptable to the Owner. The Joint Venture may also provide in a form acceptable to the Owner any bond or bonds in the name of the Joint Venture in lieu of the co-surety arrangement; provide an Up Front Joint Agreement (SAA Form #1), and an executed copy of the indemnity agreement signed by all of the Parties associated with the SAA Form #1.

Article 7: Working Capital

7.1 All necessary working capital, when and as required for the performance and prosecution of the Contract or operation of the Joint Venture as determined by the Project Manager and approved by the Management Committee, shall be furnished by the Parties in a timely manner and proportionately in accordance with their respective interests as set forth in Article 5. Each of the Parties recognizes that the failure of any Party to contribute its full proportionate share of working capital will have serious adverse consequences for the Joint Venture and imposes an unfair burden upon the other Party(ies). As to such working capital contribution, each of the Parties waives any rights of set-off it might otherwise possess and agrees to make the working capital contributions without set-off or deduction of any type. If any Party borrows funds to meet its obligation hereunder, such borrowing shall be the sole and separate obligation of the Party and shall not be the debt or obligation of the Joint Venture. No Party or its representatives shall have the power to pledge the credit of any other Party.

7.2 Any capital contributions requested by the Project Manager from the Parties shall be subject to the approval of the Management Committee. If such request is approved, the Management Committee shall give written approval thereof, with the manner of computation, to each Party. If, within thirty (30) days of receipt of such notice, either Party fails or is unable to provide its proportionate share of the funds required by the Joint Venture, such non-contributing Party shall be in default of this Agreement. In the event the non-contributing Party fails to cure its default within seven (7) days of the date of receipt of notice, the contributing Party shall be reimbursed from any profit due the non-contributing Party for the total amount of the funds contributed, but the ownership interest of the Joint Venture shall not be adjusted or changed unless the non-contributing Party is determined to be in default and fails to cure. The Management Committee has the discretion to waive a default under this Section.

Article 8: Books and Records, Accounting and Bank Accounts

8.1 Books and Records. The Parties acknowledge and agree that _____ will be the Managing Business Party and will provide at no additional costs the accounting and financial services required of the Joint Venture as approved and determined by the Management Committee. The Managing

Business Party, on behalf of the Joint Venture, shall keep proper books, records and accounts in which full, true and correct entries will be made of its transactions, on an accrual basis, in accordance with generally accepted accounting principles, showing all costs, expenditures, sales, receipts, assets and liabilities, and profits and losses of the Joint Venture, and all other records required appropriately to reflect the conduct of the Joint Venture's affairs and the distributions provided for in Article 5. Each of the Parties shall be entitled to have its representatives examine and make copies (at its own expense) of any of the books or records of the Joint Venture at any reasonable time and without notice. The Joint Venture shall permit the use of electronic copies of its books and records. The books and records of the Joint Venture are to be retained after dissolution of the Joint Venture for such period or periods as may be required by law or the Contract, whichever is greater. The costs associated with accounting and record keeping for the Joint Venture (including federal reporting under Section 9.2 and tax matters under Section 17.6) shall be a Joint Venture cost.

8.2 Fiscal Year. The fiscal year of the Joint Venture shall commence on _____ and end on _____.

8.3 Audit. If required by the Management Committee or the Owner, the Managing Business Party shall employ, at the expense of the Joint Venture, an independent auditor acceptable to the Management Committee to conduct an audit of the financial statements, including the balance sheet and statements of income and cash flows and disclosures required under generally accepted accounting principles, of the Joint Venture each year and report to the Parties within ninety (90) days after the expiration of the fiscal year its opinion on such financial statements. Further, each Party may at its option and sole expense perform an annual audit of the Joint Venture books and records.

8.4 Reports. The Managing Business Party shall deliver to each Party:

8.4.1 Within thirty (30) days after each month period, a balance sheet and statement of income of the Joint Venture for the month;

8.4.2 Within thirty (30) days after the end of each fiscal quarter, a statement of cash flow for the Joint Venture;

8.4.3 At least two (2) weeks prior to each quarterly Management Committee meeting, a summary of the monthly financial information for the most recent completed months, and projections for the next three (3) quarters; and

8.4.4 With reasonable promptness, all such other information, reports, and projections as from time to time may reasonably be requested by either Party.

8.5 Bank Accounts. A separate bank account in the name of the Joint Venture will be established by the Joint Venture. The bank account will require the signature of an authorized representative of each Party or his or her designee for withdrawal by check or documented approval of an authorized representative of each Party or his or her designee for withdrawal by electronic means. All payments due the Joint Venture for performance of the Contract will be deposited in the account and all expenses incurred under the Contract will be paid from the account. All capital contributions made in cash and all of the Parties' other cash receipts shall be deposited in such account under such terms as directed by the Management Committee. No petty cash accounts for the Joint Venture are authorized. The Managing Business Party shall reconcile the bank account monthly and deliver a report to the Management Committee.

8.6 Disbursements from Bank Accounts. All withdrawals from the Joint Venture account will require written invoices, receipts, vouchers, or other acceptable documentation. All checks, drafts, or other orders of the payment of money, and all notes or other evidence of indebtedness issued in the name of the Joint Venture shall be signed by two (2) persons, each representing one of the Parties. Each Party shall designate an individual or individuals authorized on its behalf to provide such signatures.

8.7 Closing of Bank Account in Event of Default. In case of a material default by one of the Parties

under Article 12 of this Agreement, the then-existing Joint Venture account may be closed by the non-Defaulting Party(ies) and a new account opened in the name of the Joint Venture, but under the sole direction and control of the non-Defaulting Party(ies). Funds from the closed account shall be transferred to the new account and the then-existing account shall be closed. In such an event, the defaulting Party(ies) will no longer have any rights to the operation of the new bank account, unless and until it cures its default to the satisfaction of the non-Defaulting Party(ies).

8.8 Loans. Without the prior written consent of all Parties, the Joint Venture, the Management Committee, or any Party shall not:

8.8.1 directly or indirectly, borrow money or become otherwise obligated upon, or liable for, any monies borrowed in the name of the Joint Venture or the other Party(ies);

8.8.2 guarantee or act as surety for any obligation or liability (whether for borrowed money or otherwise), for any other person, firm or corporation.

8.9 Accounting Decisions. Subject to Section 8.1 above, all decisions for the Joint Venture as to accounting principles shall be made by the Management Committee consistent with Generally Accepted Accounting Principles ("GAAP") with the concurrence of accounting or tax experts from each Party.

8.10 Final Accounting. Upon completion of the Project, payment of all sums due under any contract pertaining to the Project, and settlement of all outstanding obligations and liabilities on the part of the Joint Venture and their respective affiliated subcontractors, the Management Committee shall arrange for a final account to be prepared showing the total net profit earned, or loss incurred, by the Joint Venture. Unless otherwise agreed by the Parties, such final account shall be audited by a firm of accountants and agreed to by the Management Committee.

Article 9: Additional Obligations of the Parties

9.1 The Joint Venture shall, in good faith, commit to achieve the minority and women owned business subcontracting goals as set forth within the Contract. The Joint Venture also agrees to comply with the MWBE Program guidance, rules and regulations.

9.2 Each Party shall use good faith efforts to provide and make available its expertise, technical resources, and information to the Joint Venture to effectuate the intent herein and in furtherance of satisfying the Joint Venture's obligations to the Owner.

9.3 Contracting and Procurement. The Management Committee or its designee shall administer and manage all contracting, procurement, and financial activities for the Joint Venture and periodically update the Parties on the status of such activities. For the avoidance of doubt, the foregoing activities relate solely to the contracting, procurement, and financial activities of the Joint Venture and not such activities as undertaken by the Parties in furtherance of the Services, Work, or both, for which they are responsible under a Task Order Agreement.

9.4 Ownership Interest. Subject to the prior written approval of the District's M/WBE Department, each Party's Ownership interest may be adjusted from time to time as provided in this Agreement. For purposes of this Agreement, the term "Pro Rata" means the ratio determined by dividing the Ownership interest of a Party to whom a particular provision of this Agreement is stated to apply by the aggregate Ownership interest of all the Parties.

9.5 Reporting Requirements. The Management Committee or its designee shall administer and manage all required state, local, and federal reporting activities for the Joint Venture, including MWBE goals, all in accordance with applicable DALLAS ISD regulations and guidelines. Each Party will be responsible for providing any required reporting information to the Managing Business Party in a timely manner to allow the timely submission of the combined data from each Party to the appropriate federal agency and/or electronic reporting system.

9.6 The Parties agree that, during the term of this Contract and for a period of one year thereafter, no Party to this Contract shall in any way intentionally induce or persuade an employee of another Party to this Contract to become an employee or agent of such Party.

Article 10: Provision of Materials, Equipment, Supplies and Services

10.1 The Parties intend that all materials, equipment, supplies, and services required in connection with the Contract will be provided by the Parties and that the Joint Venture will not acquire any materials, equipment, supplies, or services directly. In the event the Joint Venture shall procure any such materials, equipment, supplies, or services, such procurement shall be in accordance with any procurement guidelines, directives, and procedures issued or approved by the Management Committee. In addition, and to the extent applicable, any procurement activities by the Parties, Joint Venture, or both shall be conducted in accordance with applicable laws and regulations, as implemented through the Contract.

10.2 If any Party provides equipment or temporary facilities to the Joint Venture, the Party shall insure or self-insure such equipment or temporary facilities and the cost of such insurance or self-insurance shall be included in the equipment or facilities rate quoted to the Joint Venture. The Joint Venture and the other Parties will be identified as an additional insured on any such insurance when appropriate, as determined by the Management Committee.

Article 11: Compensation

11.1 In accordance with the billing period provided in the Contract, unless otherwise approved by the Management Committee, each Party shall prepare and submit by the tenth (10th) of each month, for Work performed during the prior month, invoices to the Joint Venture.

11.2 Each Party shall submit invoices in the manner required under the Contract. Each invoice shall be subject to the terms of the Contract.

11.3 The Project Manager, on behalf of the Joint Venture, will in turn prepare and submit invoices to the Owner in accordance with the provisions of the Contract and any applicable task order. Unless expressly agreed to by the Parties and permitted pursuant to the terms of the Contract, the Joint Venture shall not add any profit, fee, or other amounts to the invoices submitted by the Parties. The Parties may invoice the monthly staff costs for personnel incurred directly in the management and administration of the project subject to any restrictions in the terms of the Contract.

11.4 Subject to the provisions of Section 4.6, the Joint Venture will, upon receipt of payment from the Owner, deposit same in the Joint Venture bank account and within five (5) business days issue payments against such account to each Party for the amount(s) invoiced by each Party to the Joint Venture and allowed by the Owner, less any withholdings authorized by this Agreement and directed by the Management Committee. In the event the Owner pays less than the full amount due with respect to any invoice, such shortfall shall be allocated to the Party responsible for performing the specific Services, Work, or both, for which payment was withheld or, in the absence of information reasonably sufficient to determine the basis for such short payment, any shortfall shall be allocated between the Parties in proportion to their respective shares of the applicable invoice. No Party will unreasonably restrain or refuse to authorize withdrawal of funds for payment of proper invoices relating to performance of the Services, Work, or both.

11.6 Expenses incurred by the Parties in self performing Work under a Subcontract or Task Order Agreement shall not be considered Joint Venture expenses and, to the extent allowed under the Contract, may be included by the Parties in their respective invoices to the Joint Venture for Services provided, Work performed, or both. Unless stated otherwise in this Agreement or authorized in writing by the Management Committee, personnel expenses not directly related to the performance of the Project including but not limited to back office functions such as human resources, legal counseling and tax compliance of the Parties shall not be considered a Joint Venture expense.

11.7 Each Party shall have full and sole responsibility for the payment of any taxes, duties, fees, or assessments of any nature whatsoever levied upon it individually in connection with its Services, Work, or both, under a Task Order Agreement, including any personal income taxes levied or imposed on any of its employees or personnel or any of its subcontractor's employees or personnel.

11.8 All personnel involved in the performance of the Services, Work, or both, shall be employed by the Parties and shall remain in the employ of the respective Party. Each Party shall advance and pay all payroll costs and expenses incurred by reason of their respective personnel working in connection with the performance of the Services, Work, or both, and each Party agrees to indemnify and hold the Joint Venture and each other Party harmless from any claims and liabilities arising out of the responsibilities of that Party toward its employees, any of its related companies, and any of their personnel under all applicable laws, including labor and tax laws.

11.9 If a Party, with the prior written approval of the Management Committee, maintains a Joint Venture office dedicated exclusively for the management and administration of the DISD project independent of the Parties primary business office(s) and any of the other Party's(ies) personnel are located at the office during the duration of the project, the host Party may issue a quarterly invoice directly to the visiting Party(ies) for the pro rata cost of office space and furnishings utilized by visiting Party's(ies) personnel during the time they are engaged in the performance of Services, Work, or both, for this Joint Venture at such Joint Venture office.

11.10 The basis for the calculations of such invoices under Section 11.9 above shall be determined by the Management Committee. Such invoices shall not constitute a billing to, or on behalf of, the Joint Venture, but rather a billing directly between the Parties. The visiting Party shall pay such invoices within thirty (30) days of receipt of such invoice.

11.11 When Joint Venture funds are in excess of the needs of working capital required for the operation of the Joint Venture (as determined by the Management Committee), such excess funds, if any, shall be first applied to the return of funds advanced until such advances shall have been entirely repaid, and the balance of such excess shall be distributed as provided in Section 11.13 below, to each Party in accordance with such Party's Agreed Percentage of Participation as reflected in Article 5.

11.12 The Management Committee shall quarterly review the progress of the Services, Work, or both, and the Joint Venture's financial condition to determine whether Joint Venture profits, if any, should be distributed. If the Management Committee determines that earned profits and reserves for contingencies, including cash contributions, are adequate to meet the Joint Venture's needs, it may direct the Managing Business Party to distribute earned Joint Venture profit to the Parties based upon their respective Agreed Percentage of Participation. For the avoidance of doubt, payments to a Party for self-performed services related to the construction project, Work performed, or both, pursuant to a Task Order Agreement shall not be considered distributions of Joint Venture capital or profits.

11.13 The Management Committee shall establish cash reserves and revenue reserve funds to be retained by the Joint Venture from time to time in order to assure adequate funding for all Joint Venture obligations as they relate to future profits, losses, liabilities, and contract performance. At the direction of the Management Committee, the Project Manager shall invoice each of the Parties for approved reserves and capital contributions.

Article 12: Default and Insolvency

12.1 If a Party shall be in default hereunder (as specified in Sections 4.3 (Management Committee meetings), 7.2 (capital contributions), 9.4 (Owner-issued notice of default), 25.8 (breach of covenants), or 25.9 (anti-bribery laws), or Article 15 (assignment and change of control)), and fail to promptly (but in no event more than seven (7) days thereafter) cure such default after written notice or demand; cease or otherwise fail to timely pay for goods or services (including labor), and fail to promptly (but in no event more than seven (7) days thereafter) cure such default after written notice or demand; cease to operate or terminate its business affairs; institute an insolvency proceeding under applicable law; permit the entry of

any order for relief under Chapter 7 of the Bankruptcy Code; or fail to cure a default hereunder after entry of an order for relief under Chapter 11 of the Bankruptcy Code, (such Party being hereinafter referred to as "Defaulting or Insolvent Party"), then from and after such date:

12.1.1 All acts, consents and decisions with respect to the performance of the Contract or the management of the Joint Venture shall thereafter be taken solely by the remaining Party without considering the Defaulting or Insolvent Party.

12.1.2 The participation of the Defaulting or Insolvent Party in the profits of the Joint Venture shall be limited to that proportion which the Defaulting or Insolvent Party's contributions to the working fund of the Joint Venture bear to the total of such contributions as same may be modified by and subject to the provisions of Section 7.2, but the Defaulting or Insolvent Party shall be charged with, and shall be liable for, any and all losses that may be suffered by the Joint Venture under the Contract, or any additions or supplements thereto or modifications thereof, to the full extent of the Defaulting or Insolvent Party's Percentage of Participation, set forth in Article 5.

12.1.3 The non-Defaulting Parties shall have the right to take over and complete the Services, Work, or both. Without limiting the generality of the foregoing, the non-Defaulting Parties may, for the purpose of completing the Work, enter upon the site and take possession of all materials, equipment, scaffolds, tools, appliances and other items thereon, which have been purchased or provided for the performance of the Work, all of which the Defaulting or Insolvent Party hereby transfers, assigns and sets over to the non-Defaulting Parties for such purpose, and to employ any person or persons to complete the Work and provide all of the required labor, services, materials, equipment and other items. The non-Defaulting Parties may complete the Services in whatever fashion it deems most efficient and shall have the right to use the existing work product for purposes of completing the Project. In such event, the non-Defaulting Parties shall receive any and all payments, including fees, which would otherwise be due for such Services, Work, or both, and apply the proceeds thereof (i) to cover all expenses incurred by the non-Defaulting Parties in taking over and completing (by use of its own forces, subcontracting or otherwise) such Services, Work, or both and (ii) to establish a contingency fund to cover any and all outstanding warranties or other obligations of the non-Defaulting Parties with respect to such Services, Work, or both, or any other uncured defect or deficiency for which the non-Defaulting Parties are responsible.

12.1.4 The non-Defaulting Party shall have the right to establish a new Joint Venture bank account in accordance with Section 8.7 of this Agreement.

12.2 If a Party is in material default of the requirements of the Contract, including (i) failure to perform or progress the Services within the timeframe specified in the Contract; (ii) serious or repeated breaches of the safety requirements; or (iii) is in breach of the requirements of the Services to be provided, the Work to be performed, or both, by that Party and fails to cure such breach within seven (7) days after written notice or demand, then from and after such date, the non-breaching Party shall have the rights afforded it under Subsections 12.1.1 through 12.1.3 above. Nothing in this Agreement shall be interpreted or construed to relieve the defaulting Party from their obligations under this Agreement or their obligations under the Contract with the Owner.

12.3 In the event of a default of this Agreement, the non-Defaulting Parties shall additionally be entitled to exercise all applicable remedies available to it, whether at law, in equity or otherwise, including an action to recover the losses sustained in excess of its proportionate share hereunder, specific performance, and the right to declare the Joint Venture dissolved and terminated without the necessity for judicial determination. Upon such dissolution, the non-Defaulting Parties shall immediately commence to wind up the Joint Venture's affairs, including completion of the aforesaid Contract, and shall liquidate the assets of the Joint Venture as promptly as reasonably possible.

Article 13: Liabilities

13.1 The liability of the Parties under this Agreement shall be joint and several. Notwithstanding the foregoing, as between the Parties, any liability (whether to the Owner or any third party) that the Joint Venture or any Party (including its parental guarantor, if any) may incur arising from or relating to the Contract or the performance of Services, Work, or both, under the Contract or this Agreement shall be allocated as between the Parties in proportion to the Agreed Percentage of Participation of each Party, except as set forth below:

13.1.1 Liability or related losses caused by the negligence, gross negligence, willful misconduct, fraud, or violation of legislation, laws, ordinances, codes or regulations of a Party (including its officers, employees, agents, representatives, and subconsultants and subcontractors at any tier), shall be assumed by such Party;

13.1.2 In the event of a default by a Party, liability or losses sustained by the Joint Venture or the non-Defaulting Parties shall be assumed solely by the defaulting Party;

13.1.3 Liability or related losses resulting from claims made by an employee of a Party against the Joint Venture or each other Party based on the employee-employer relationship, including the payment of unemployment taxes, withholding taxes, and employment benefits, will be solely assumed by the Party by whom such person is employed;

13.1.4 Liability or related losses traceable directly to and caused by a Party (including its officers, employees, agents, representatives, and subconsultants and subcontractors at any tier) shall be assumed by that Party;

13.1.5 In the event of a breach by a Party in the performance of its obligations under this Agreement, liability or losses sustained by the Joint Venture, the non-breaching Party, or both, as a result of such breach shall be assumed solely by the breaching Party; and

13.1.6 Liabilities or related losses relating to third-party claims resulting from Services provided, Work performed, or both, jointly by the Parties (including their respective officers, employees, agents, representatives, and subconsultants and subcontractors at any tier) shall be allocated to each Party in accordance with each Party's respective, relative degree of fault or responsibility, as determined by an allocation of fault pursuant to either an agreement between the Parties or a finding made by the trier-of-fact in a judicial proceeding.

13.2 With respect to the liabilities allocated in Subsections 13.1.1 through 13.1.5 above, the Party to whom such liability is allocated shall defend, indemnify, and hold harmless the Joint Venture and each other Party from any and all such claims, losses, or liabilities set forth in such subsections (including reasonable attorneys' fees). With respect to the liabilities allocated in Subsection 13.1.6 above, each Party agrees to defend, indemnify, and hold harmless the Joint Venture and each other Party from any and all such claims, losses, and liabilities (including reasonable attorneys' fees) that are in excess of such other Party's relative degree of fault or responsibility, as determined by an allocation of fault pursuant to either an agreement between the Parties or a finding made by the trier-of-fact in a judicial proceeding.

13.3 With respect to any claims, losses, and liabilities not covered by Sections 13.1.1 through 13.1.6 above, each Party agrees to defend, indemnify, and hold harmless the Joint Venture and each other Party from any and all such claims, losses, and liabilities (including reasonable attorneys' fees) arising from or related to the Contract or the performance of the Work, Services, or both, under the Contract, or this Agreement that are in excess of such other Party's Agreed Percentage of Participation, irrespective of the contributory fault, negligence, or strict liability of the indemnified Party(ies).

13.4 If a dispute arises between the Parties as to the allocation of liability and/or related losses each Party should bear, each Party shall provisionally assume a share of such liability in proportion to its Agreed

Percentage of Participation until the dispute is resolved.

13.5 For any such claims, losses, and liabilities, the indemnifying Party's obligations regarding any defense thereof include only the reimbursement of the indemnified Party's(ies) reasonable defense costs incurred to the extent of the indemnifying Party's actual indemnity obligations hereunder.

Article 14: Insurance

14.1 The Parties agree that they will acquire all necessary insurance in connection with the award and performance of a Dallas ISD Contract, including but not limited to general liability or professional liability, builder's risk, worker's compensation or any other insurance required under the Contract. [Optional provisions in the alternative, the Parties agree to provide the specific operational insurance coverage as follows:

14.1.1 Workers' Compensation for statutory limits in compliance with the applicable state and federal laws;

14.1.2 Employer's Liability with a limit of $_____;

14.1.3 Commercial General Liability, including Products and Completed Operations, Contractual Liability, and Broad Form Property and Personal Injury Liability, with a combined single limit of $_____ per occurrence and in the aggregate;

14.1.4 Automobile Liability Insurance with a combined single limit of _____ for bodily injury and property damage with respect to vehicles either owned, non-owned, and leased by a Party in the performance of Services under the Contract or this Agreement;

14.1.5 Commercial General Liability Insurance in the amount of _____ per claim and in the aggregate_____.;

14.1.6 Umbrella Liability in excess of (.2), (.3) and (.4) above, with an aggregate limit of _____ if required by the Contract. (Note: limit requirements can be satisfied by any combination of Primary and Excess coverage); and

14.17 Any insurance written on a "claims made" basis shall (a) have a retroactive date of no later than the earlier of the date of this Agreement or the earliest commencement of the Party's Services or Work in relation to the Project and (b) be maintained for at least 3 years after the latest completion of the Services or Work, or termination of the Contract, whichever is later.

14.1.8 Each Party shall endorse its Commercial General Liability, Automobile Liability, Contractor's Pollution Liability and, if applicable, Umbrella insurance policies to provide that the Joint Venture is an additional insured under its policies for that Party's interest in the Joint Venture. The other Party and, if required by the Contract, the Owner, shall also be included as an additional insured. Each Party's Professional Liability insurance policy shall, if necessary, be endorsed to include the liability of the insured arising out of the insured's interest in the Joint Venture.]

14.2 The policies and limits specified by Dallas ISD in the Contract represent the minimum coverage to be carried by each of the Parties hereunder. Notwithstanding the foregoing, if the Contract requires the Joint Venture and/or the Parties to maintain additional coverage and/or increased limits, the Parties shall be required to procure such additional insurance in accordance with the terms of the Contract.

14.3 Each Party hereby waives and shall obtain from all of its Commercial General Liability, Automobile Liability, Contractor's Pollution Liability and, if applicable, Umbrella insurance carriers a waiver of any rights of subrogation against each other Party and their directors, agents, employees, and assignees, with respect

to risks associated with the Services provided, Work performed, or both, pursuant to the Contract.

14.4 Unless noted otherwise or with the written approval of the Management Committee, the cost of any insurance required herein (including any deductibles and self-insured-retention amounts) shall be the responsibility of the Party procuring such coverage.

14.5 The Management Committee, in its discretion, shall be responsible for obtaining insurance for the Joint Venture for management risks such as Directors & Officers Liability, Fiduciary Liability, and any other insurance coverage deemed appropriate by the Management Committee, the cost of which shall be an expense of the Joint Venture.

14.6 Absent written approval from the Management Committee, all lower-tier subcontractors, whether retained directly by the Joint Venture or by a Party to the Joint Venture, shall be required to comply with the provisions of this Article 14.

Article 15: Assignment or Change in Control

15.1 Each Party is entering into this Agreement in reliance upon each other Party being and remaining a party to this Agreement. No Party to this Agreement shall, directly or indirectly, sell, assign, transfer, dispose of, pledge or hypothecate its rights, interest or obligations hereunder, or any part thereof, whether directly or by merger with or acquisition by another entity, in this Agreement, the Joint Venture, the Contract, or in any property or monies of the Joint Venture, except with the prior written consent of each other Party, and, if required by the Contract, with the prior written consent of the Owner. A "Change in Control" shall mean the sale of all or substantially all the assets of a Party; any merger, consolidation or acquisition of a Party with, by or into another corporation, entity or person; or any change in the ownership of more than fifty percent (50%) of the voting capital stock of a Party.

15.2 No Party shall, without the written consent of each other Party, assign, transfer or sublet any claims, causes of action or rights against each other Party arising from or under this Agreement; or any proceeds from claims arising from or under this Agreement or the Contract as security, collateral or the source of payment for any notes or liabilities to any third party; or any control of any claims or causes of action arising from or under this Agreement or the Contract without the written consent of each other Party.

15.3 Any such attempted sell, assignment, transfer, disposal, pledge, hypothecation, or sublet without the written consent of each other Party shall be void and confer no rights upon any third person and shall constitute a default hereunder. The provisions of this Article shall survive the completion or termination of this Agreement for any reason and shall remain enforceable between the Parties.

Article 16: Disputes

16.1 The Parties shall attempt in an amicable manner to adjust and settle any disagreement that may arise between them under or in connection with this Agreement. Any controversy or claim arising out of or relating to this Agreement will first be referred in writing to the Management Committee for its decision.

16.2 In the event any dispute between the Parties is not resolved by the Management Committee, either Party may submit such dispute to the Chief Executive Officer of each Party. Submittal of the dispute shall be in writing and summarize in detail the dispute or contested issues. Upon receipt of the dispute, the receiving Party shall designate within ten (10) days a responsible executive with authority to negotiate a settlement or resolution of any dispute. The Parties designated responsible executives for all Parties shall convene within thirty (30) days of the submittal at such location as the Parties may agree. The responsible executives shall hear such dispute at a time, place, and under such procedural rules as they may specify, and shall act only by unanimous consent. It is the intention of the Parties that the responsible parties shall mutually resolve disputes without litigation. However, nothing herein shall be deemed to require any Party to exhaust this procedure prior to exercising whatever rights it might have at law or equity and any litigation shall be stayed pending exhaustion of this dispute resolution procedure. The Parties recognize the possibility of deadlock from elevating the dispute or controversy to the Chief Executive Officer but intend

that through this mechanism, disputes may be discussed and resolved without the need of litigation.

16.3 If the dispute is not resolved in accordance with Section 16.2 above, the Parties shall submit their disputes to mediation within seven (7) days thereafter or as soon thereafter as may be arranged with the mediator. The Parties shall mutually agree to one mediator. In the event they cannot mutually agree to such a mediator, the mediator shall be selected under the Construction Industry Rules of the American Arbitration Association, unless otherwise agreed between the Parties.

16.4 If mediation is unsuccessful in resolving all disputes between the Parties or the dispute cannot be settled by mediation within sixty (60) days, then the Parties agree to consider the use of binding arbitration to resolve their dispute in the following manner or either Party may file a claim in a court of competent jurisdiction with venue in Dallas County. In the event the Parties agree to resolve their dispute by means of binding arbitration, the Parties shall mutually agree to one arbitrator. In the event they cannot mutually agree to such an arbitrator, one arbitrator shall be selected in accordance with the Construction Industry Rules of the American Arbitration Association, unless otherwise agreed between the Parties. The arbitrator thus selected shall thereafter proceed to ascertain the facts relating to such dispute and to make a determination thereof; the determination of the arbitrator shall be final, binding and conclusive upon the Parties and enforceable at law in a court having jurisdiction over the Party against whom enforcement of the arbitrator's decision is sought to be enforced. The then-current Construction Industry Rules of the American Arbitration Association will be applied.

16.5 Notwithstanding the foregoing, if and to the extent that a dispute between the Parties relates to a claim, controversy or dispute involving the Owner and/or the Contract (such that in the interest of judicial economy and to avoid the possibility of inconsistent judgments, a single dispute resolution proceeding is warranted), then the Parties agree that the dispute resolution provisions in the Contract, if any, shall apply and take precedence over the provisions of this Article 16.

16.6 The Parties shall not allow any dispute to affect or threaten the progress and completion of the Services, Work, or both. Each Party shall remain responsible for the performance of its obligations under this Agreement and the Contract and shall continue to perform and prosecute the Services, Work, or both, as directed by the Project Manager during any dispute resolution process notwithstanding any such dispute.

Article 17: Distributions and Tax Allocations

17.1 Subject to the terms and conditions of this Agreement, including Articles 11 and 12, distributions may be made to the Parties during the term of this Agreement at such times, in such amounts, and subject to such conditions as the Management Committee may from time to time determine.

17.2 Should the Joint Venture make any advances or loans to either Party, then distributions to be made pursuant to Section 17.1 above shall be applied in repayment of such advances or loans, together with interest, until repaid in full, notwithstanding the fact that such advances or loans may not then be due and payable according to the terms of any instrument evidencing such advance or loan.

17.3 No distribution shall be made pursuant to this Agreement if the making of such distribution would create an event of default under any loan agreement, any mortgage, or other security instrument to which the Joint Venture is subject, or otherwise materially adversely affect the ability of the Joint Venture to perform its obligations under any other agreement to which the Joint Venture is subject. Any distribution pursuant to this Article, to the extent not permitted by the previous sentence, shall be deferred until such time as it will not create an event of default or materially adversely affect the ability of the Joint Venture to perform its obligations. If any such distribution can at any time only be made in part, it shall be made to the Parties in proportion to the amounts that would have been paid to them but for this Article 17.

17.4 Except as provided in Section 17.1 above, and except for distributions upon termination or withdrawal as provided herein, the Joint Venture shall make no further distributions.

17.5 Tax Allocations. All gross income, gains, losses, deductions, and credits of the Joint Venture, as

determined for US federal income tax purposes, shall be allocated for such purposes among the Parties in the same proportions as the corresponding items of revenue, gains, losses, and expenses are allocated pursuant to Article 5 above.

17.6 Designation of Tax Matters Partner/Partnership Representative

17.6.1. Designation. The Management Committee shall designated an individual as the Tax Matters Partner within the meaning of IRC §6231(a)(7) as in effect for taxable years beginning on or before December 31, 2017 and the Partnership Representative within the meaning of IRC §6223(a) as in effect for taxable years beginning after December 31, 2017 and shall act in any similar capacity under applicable state, local, or foreign law (in such capacity and hereinafter, the "Tax Matters Partner").

17.6.2. Elections. Except as otherwise expressly provided to the contrary in this Agreement, all tax elections, including federal, state, local, and foreign tax elections, shall be made by the Tax Matters Partner in its sole discretion. To the extent applicable, the Tax Matters Partner will make the small partnership election as described in IRC §6221(b) as in effect for taxable years beginning after December 31, 2017.

17.6.3. Expenses of Tax Matters Partner; Indemnification. The Tax Matters Partner shall be reimbursed for all reasonable expenses, including legal and accounting fees, claims, liabilities, losses, and damages, incurred in connection with any administrative or judicial proceeding with respect to the tax liability of the Parties attributable to this Agreement. The payment of any and all such then-existing expenses shall be made before any distributions are made to each Party. Neither the Tax Matters Partner nor any Party shall have any obligation to provide funds for such purpose.

17.7 Requirement to Prepare and File Tax Return. The Tax Matters Partner shall cause the preparation and timely filing of all tax and information returns required to be filed pursuant to the Internal Revenue Code and all other tax returns deemed necessary and required in each jurisdiction in which the Joint Venture does business. Copies of the returns, or pertinent information from the returns, shall be furnished to the Parties no later than two months before the extended due date of the Joint Venture's federal income tax return. The Tax Matters Partner will direct that any tax imposed upon the partnership be paid by the partnership to federal, state, city or other municipalities as required by law.

17.8 Capital Structure of Joint Venture

Names of Party	Percentage Interests	Capital Contribution
_____	___ %	$_____
_____	___%	$_____
_____	___%	$_____

17.9 Amounts Withheld. All amounts withheld pursuant to the Internal Revenue Code or any provision of any state, local, or foreign tax law with respect to any payment, distribution, or allocation to the Parties shall be treated as amounts paid or distributed, as the case may be, to the Parties. The Joint Venture is authorized to withhold from payments and distributions, or with respect to allocations to the Parties, and to pay over to any federal, state, local, or foreign government, any amounts required to be so withheld

pursuant to the Internal Revenue Code or any provisions of any other federal, state, local, or foreign law, and shall allocate any such amounts to the Parties with respect to which such amount was withheld and shall offset amounts otherwise distributable to such Party.

Article 18: Completion of Project, Division of Profit

Upon completion of the Project, after providing for and paying all costs disbursed or incurred for its performance, and all other costs and charges required by the Contract and ordinarily and usually charged as costs in performance of such a Contract, including payment of all claims not secured by insurance, or by providing proper reserves for any such claims, which shall have either been brought against the Parties or may be reasonably anticipated, and after providing adequate reserves for any other contingency, if any, that shall be determined by the Management Committee to be reasonably necessary; and after repaying all sums advanced by the Parties for working capital, any undistributed profits thereafter remaining, resulting from the performance of the Contract, shall be distributed and divided between the Parties in accordance with their ratable proportion as determined under Articles 5, 7, and 12. Any reserves, when no longer required, or so much thereof as shall remain, shall be similarly distributed.

Article 19: Successors and Assigns

Subject to the foregoing provisions herein contained, this Agreement shall inure to the benefit of, and be binding upon the Parties, their successors, trustees, permitted assigns, receivers, and legal representatives, but shall not inure to the benefit of any other person, firm or corporation.

Article 20: Entire Agreement

20.1 This Agreement constitutes the entire understanding and Agreement between the Parties with respect to the subject matter hereof and supersedes all prior or contemporaneous representations, understandings or agreements of any kind, whether verbal or written.

20.2 This Agreement shall not be modified except by written amendment duly executed by authorized representatives of the Parties. Any such written amendments shall be forwarded to the district for review and approval. Each Party has had the opportunity to avail itself of legal advice and counsel. No Party shall be deemed to be the drafter or author of this Agreement. In the event this Agreement is subject to interpretation or construction by a court of law or panel of arbitration, such court or panel shall not construe this Agreement or any portion hereof against either Party as the drafter of this Agreement.

20.3 Failure of a Party to insist upon strict and punctual performance of any terms or conditions of this Agreement shall not be construed to constitute a waiver of, or estoppel against, any other Party later asserting the right to require such performance. Neither shall a waiver or estoppel in one instance constitute a waiver or estoppel with respect to a later default, whether similar or dissimilar in nature.

20.4 If any provision of this Agreement is held invalid or unenforceable by any court of competent jurisdiction, the other provisions of this Agreement will remain in full force and effect.

Article 21: Confidential Information

21.1 Subject to any applicable requirements of the Contract, 1) information relating to this Agreement or the Contract which is gathered, exchanged, or otherwise obtained by the Parties during the term of this Agreement shall be maintained in confidence and shall not be utilized except for purposes in furtherance of this Agreement and the exercise of rights, obligations, duties, and privileges set forth herein; and 2) such information will not be disclosed to any third parties or to a Party's own personnel except where there is good faith need to know; provided however, that no Party shall be liable for any utilization or disclosure if the information falls into any of the following categories:

21.1.1. Information which at the time of disclosure is or thereafter becomes within the public

domain other than by reason of the disclosing Party's breach of this Agreement.

21.1.2. Information that prior to disclosure hereunder was already in the recipient's possession and was not the subject of any confidentiality obligation of the disclosing Party.

21.1.3. Information which, subsequent to disclosure hereunder, is obtained by the disclosing Party from a third party lawfully in possession of such information and which information is not subject to a confidentiality obligation.

21.2 For the purposes of this Agreement, specific information disclosed shall not be deemed to be in the public domain or in the prior possession of the disclosing Party merely because it is embraced by more general information in the public domain or by more general information in the prior possession of the Party.

21.3 Nothing herein shall be construed as giving a Party any right, title, interest in, or ownership of information, or any portion thereof, that is now or is hereafter covered by any patent or license. The Parties' rights in respect thereof shall be subject to all rights of the patent owner and/or licensor.

21.4 A Party shall not be restricted in releasing information in response to a subpoena, court order, or similar legal process, but shall, if not restricted under a subpoena, court order, or similar legal process, promptly notify each other Party of the request or order for information before responding to same and provide each other Party with a copy thereof so that each other Party may take such action as it deems appropriate to protect its information.

21.5 Except as otherwise provided herein or in the Contract, engineering documents, drawings, and specifications prepared by a Party as part of the Services, Work, or both, shall be the property of the Party preparing same. A Party shall retain all right, title, and interest in its standard drawings and details, designs, specifications, databases, computer software and any other proprietary property ("Party Data"). To the extent the work product contains or requires the use of Party Data by any other Party, the owning Party hereby grants to the other Party(ies) a non-exclusive, non-transferrable and royalty free license to use such Party Data solely for the purposes for which the work product was developed under the Contract.

21.6 The confidentiality obligations provided in this Article 21 shall survive the termination or expiration of this Agreement and remain binding upon the Parties for two (2) years following the termination of this Agreement or completion of the Contract, whichever is later.

21.7 No news release, including photographs and films, public announcement, denial, or confirmation shall be made by a Party concerning the subject matter of this Agreement without first obtaining the consent of each other Party and, if applicable, the Owner.

Article 22: Applicable Law

This Agreement shall be governed and construed in accordance with the laws of the State of Texas, without reference to its conflict of laws principles.

Article 23: Miscellaneous

23.1 Records; Generally. Each Party agrees to keep accurate and complete cost, correspondence, and other records related to this Agreement. Each Party further agrees to make such records available to each other Party upon ten (10) calendar days' written notice. The joint venture parties agree to maintain records showing the subcontractor/supplier awards, subcontractor payment history, efforts to identify and award contracts to M/WBEs, and copies of executed contracts with M/WBEs. The joint venture parties agree to provide access to books, records and accounts to authorized district, state and federal officials for the purpose of verifying M/WBE participation and good faith efforts.

23.2 Financial Records.

23.2.1 All financial records and proprietary or confidential information of each Party to which the Joint Venture or the other Party(ies) has/have access shall be held and retained by the Joint Venture and such other Party(ies) in strict confidence and not be disclosed without the prior written consent of the Party to whom such records or information belong.

23.3 Other Business Activities. During the term of this Joint Venture, each of the Parties may, and shall be free to, participate and engage in any other business activities, subject to any applicable organizational and personal conflict of interest rules or regulations. Nothing in this Agreement shall restrict, or be construed as a limitation of the powers or rights of any Party hereto to pursue other unrelated opportunities or Projects at the District or enter into other joint venture arrangements for its sole benefit independent of the solicitation the subject of this Agreement.

23.4 Notice. Any notice required or permitted to be given under this Agreement shall be deemed served if sent by registered mail, personal delivery, or other means whereby receipt is acknowledged to the following addresses or such other addresses as the Parties may designate:

For _____ _____
_____
Attention: _____
Telephone: _____

For _____: _____
_____
Attention: _____
Telephone: _____

For _____: _____
_____
Attention: _____
Telephone: _____

23.5 Waiver of Consequential Damages. No Party shall be liable to the other Parties for any special, indirect, punitive, exemplary, incidental, or consequential damages of any nature, including loss of actual or anticipated profits or revenues, loss of opportunity, loss by reason of shutdown, non-operation, increased expense of manufacturing or operation, loss of use, cost of capital, damage to or loss of property or equipment, or claims of customers, regardless of whether due to or based upon contract, tort, negligence, or strict liability. The foregoing limitation of liability shall not apply to third party claims for which a Party is otherwise entitled to indemnity under this Agreement.

23.6 Nothing in this Agreement shall be deemed to create any right in anyone not a party and this Agreement shall not be construed in any respect to be a contract in whole or in part for the benefit of anyone not a party.

23.7 Counterparts. This Agreement may be executed in one or more counterparts, each of which will be deemed to be an original copy of this Agreement and all of which, when taken together, will be deemed to constitute one and the same agreement.

23.8. Recruitment of Employees. The Parties acknowledge the value of team performance and trust, both of which could be adversely impacted by movement of employees from one Party to another Party. Accordingly, the Parties agree that they will not initiate efforts aimed at hiring the other Parties personnel that are actively engaged in activities covered by this Agreement without prior consent of the other Party. Should an employee of one Party become an employee of another Party, that individual shall be barred from working on activities covered by the Agreement for a period of not less than twenty-four (24) months. The Management Committee may waive the 24-month period at its discretion. This section shall not restrict

the right of a Party to solicit generally in the media or other sources for required personnel nor prevent the hiring of an employee of one Party who independently seeks employment with another Party without personal solicitation by the other Party.

23.9 Representations, Warranties, and Covenants. Each Party represents, warrants, and covenants to each other Party, as of the Effective Date, as follows:

23.9.1 It is a duly organized and validly existing corporation in good standing under the laws of the state in which it is incorporated or formed; it is duly qualified to do business in each jurisdiction in which the nature of the business transacted by it requires such qualifications; it has all corporate powers as may be required to conduct its business and carry out the transactions contemplated hereby;

23.9.2 The execution and delivery of this Agreement and the performance by it of the transactions contemplated hereby have been duly authorized by all necessary corporate action and this Agreement constitutes a legal, valid, and binding obligation enforceable in accordance with its terms;

23.9.3 It has, and at all times during the term hereof shall maintain, all governmental authorizations necessary to perform its obligations under this Agreement and the Contract; and

23.9.4 There is no action, suit, proceeding, claim, or dispute pending or, to its knowledge, threatened against or affecting it or its assets before any governmental body that is reasonably expected to have a material adverse effect on it or its ability to perform its obligations under this Agreement or the Contract.

23.10 Marketing Efforts. The Parties acknowledge that marketing efforts related to the Contract need to be coordinated by and between the Parties. The Project Manager will be responsible for coordinating any such efforts. All marketing efforts directly associated with the Contract or this Agreement shall be coordinated through the Project Manager, who will decide whether a proposed Owner visit, or other marketing effort is necessary or appropriate.

23.11 Survival. The provisions of this Agreement which by their nature are intended to survive the termination or dissolution of the Joint Venture, including indemnities and any expressed limitations of or releases from liability, shall continue as valid and enforceable obligations of the Parties notwithstanding any such termination or dissolution.

Article 24: Compliance

24.1 Management Systems. Each Party shall use its own management systems to conduct and record its business for the Joint Venture. Such systems shall, at a minimum, include the following components: financial management, accounting, MWBE subcontractor payment tracking, procurement, property control, estimating, and contract administration. All management systems must comply with any applicable Contract requirements.

Article 25: Anti-Bribery and Anti-Corruption Laws

25.1 No Party shall, directly or indirectly, undertake nor cause nor permit to be undertaken any activity that:

25.1.1 is illegal under applicable law or regulation; or

25.1.2 would have the effect of causing the Joint Venture or the Parties or their respective subsidiaries or affiliates to be in violation of the applicable laws or regulations, including the U.S. Foreign Corrupt Practices Act or the UK Bribery Act, as applicable.

25.2 In connection with this Agreement, no Party shall give, offer, promise, or authorize, directly or indirectly, anything of value to:

25.2.1 an official, officer, employee or any other person acting in an official capacity for or on behalf of any government (including any department, agency, or instrumentality thereof), state-owned enterprise, international organization, or any subdivisions, agents or advisors thereto, whether paid or unpaid (any such person referred to collectively as "Official"), including the government(s) of the territories in which work will be performed hereunder;

25.2.2 any person(s) or party(s) while knowing or having reason to know that such thing of value is to be given, offered, or promised to an Official in order to:

25.2.2.1 influence any official act or decision, or;

25.2.2.2 induce an Official to do or omit to do any act in violation of his or her lawful duty, or;

25.2.2.3 induce an Official to use his or her influence to affect or influence a decision or act of any government, instrumentality, or international organization, or;

25.2.2.4 assist the joint venture or the Parties hereto or any other person in obtaining or retaining business for or with, or in directing business to the Parties or any other person, or;

25.2.2.5 obtain or secure an unfair or improper advantage for the joint venture or the Parties in any respect.

25.3 In connection with this Agreement, no Party shall make a contribution or give, offer, promise or authorize, directly or indirectly, anything of value to any political party, official of a political party or candidate for office on behalf of or associated with the joint venture or the Parties or in connection with the purpose of this Agreement or the contract with the Owner.

25.4 In connection with this Agreement, no Party shall engage in any acts of bribery, kickback or other improper inducement, including bribery of a person in the private sector. Without limiting the generality of the foregoing, no Party shall give, offer, promise or authorize, either directly or indirectly, a financial or other advantage to any person to induce a person to perform improperly a relevant function or activity or to reward such improper performance or where the Party knows or believes that the acceptance of the advantage in itself constitutes the improper performance of a relevant function or activity.

25.5 No Party shall subcontract any part of the Services nor retain or engage a consultant to carry out sales or marketing obligations in connection with the scope of this Agreement without obtaining the JV Management Committee's prior written consent. The Joint Venture Management Committee shall have the right, in accordance with this Agreement, to reject a request to engage or retain any such consultant.

25.6 The Parties hereby covenant that neither they nor any of their respective officers, directors, agents or representatives or employees assigned to the Project an employee of the Owner or any governing body having jurisdiction over the Project. The Parties further covenant that no Official, political party official, or candidate for political office is deriving any benefit, directly or indirectly, from this JV Agreement. The Parties agrees to notify the Joint Venture Management Committee immediately of any changes to this covenant.

25.7 In no case shall any Party be obligated to take any action or make any payment to any other Party or anyone else that would cause the Joint Venture or the Parties to suffer a penalty or contravene applicable laws or regulations, including the laws of the territories in which work will be performed and those of the United States.

25.8 Notwithstanding any other provisions of this Agreement, if any Party breaches any of the covenants contained in this section, the other Parties shall have the right to immediately terminate this Agreement without penalty. In such instance, the breaching Party shall indemnify the other Parties and the Joint Venture for any penalties, losses, and expenses resulting from such breach of the provisions of this section.

25.9 Each Party agrees to promptly notify the Management Committee and the other Parties in the event it becomes aware of or discloses any potential violation of Anti-Bribery Laws in connection with this Agreement. In addition, a Party shall be in default of this Agreement if such Party is (i) found to have violated Anti-Bribery Laws by a governmental body empowered to make such a finding, or (ii) the subject of a governmental investigation involving violations of Anti-Bribery Laws in connection with this Agreement and the other Parties (that are not a target of such investigation), in their reasonable discretion, believe that the on-going investigation materially impairs the ability of the Joint Venture to provide the Services, perform the Work, or both, and/or complete the Contract.

[SIGNATURES ON THE FOLLOWING PAGE]

NOTARY REQUIRED

IN WITNESS WHEREOF, the Parties have caused this Agreement to be signed by their duly authorized representatives, in duplicate counterparts, each having the same effect, as of the date and year first above written.

Signature: _____

Name: _____

Title: _____

Date: _____

Signature: _____

Name: _____

Title: _____

Date: _____

Signature: _____

Name: _____

Title: _____

Date: _____

EXHIBIT A

Scope of Services

Identify the distinct, clearly defined portion of the work provided by each M/WBE joint venture partner. The work must be separate, clear and distinguishable. Specify the nature of the work and what it will entail. Describe the portion of the work or elements controlled by the M/WBE joint venture partner. Provide the estimated value of those services commensurate with the percentage ownership interest.

(1) General Description of Work to be Performed by the Joint Venture:

(2) Division of Work and Allocation of Responsibilities:

EXHIBIT B

Project Management Staffing Plan

Provide a staffing plan to be determined per the established participation percentages. Provide information relating to the approximate number of employees that will be required to perform the scope of work. Specify the number of employees to be provided by the M/WBE joint venture partner(s), titles, resumes and job responsibilities.

EXHIBIT C

Letter from Financial Institution or Bonding Surety Company

6.3 Provide documentation to substantiate the financial strength or bonding capacity of each M/WBE joint venture partner(s). This document should be commensurate of each M/WBE joint venture partner(s) percentage split. *Or* Provide an Up-Front Joint Agreement (SAA Form #1), and an executed copy of the indemnity agreement signed by all Parties associated with the SAA Form #1.

DRAFT

AIA® Document A101™ – 2017

Standard Form of Agreement Between Owner and Contractor

where the basis of payment is a Stipulated Sum

AGREEMENT made as of the XX day of XXXXX in the year 20XX
(In words, indicate day, month and year)

BETWEEN the Owner:
(Name, , address and other information)

The Dallas Independent School District, a political subdivision of the State of Texas
Dallas, Texas
9400 North Central Expressway
Dallas, Texas 75231

and the Contractor:
(Name, , address and other information)

<<GC Company Name>>
<<GC Address>>
<<GC City/State/Zip>>
(###) ###-#### Phone

The Work, unless otherwise expressly stated, shall be considered as a single project (whether one or more campuses or facilities) and is generally described as follows:(Name and location)

<<BP# XXX:>>
<<ORG #XXX XX Elementary School>>
<<ORG Address>>
<<Dallas, Texas 75XXX>>

The Architect is:
(Name, address and other information)

<<A/E Company Name>>
<<A/E Address>>
<<A/E City/State/Zip>>
(###) ###-#### Phone

The Program Manager is:
(Name, address and other information)
<<Insert PMF Company Name>>
3801 Herschel Avenue
Dallas, TX 75219

The Owner and Contractor agree as follows.

Version 3/25/2022 FINAL

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

The parties should complete A101™–2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201™–2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

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TABLE OF ARTICLES

1 THE CONTRACT DOCUMENTS

2 THE WORK OF THIS CONTRACT

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7 TERMINATION OR SUSPENSION

8 MISCELLANEOUS PROVISIONS

9 ENUMERATION OF CONTRACT DOCUMENTS

10 INSURANCE AND BONDS

ARTICLE 1 THE CONTRACT DOCUMENTS

§ 1.1 The Contract Documents consist of this Agreement between Owner and Contractor, A101-2017, as amended (hereinafter the "Agreement"); Conditions of the Contract, as amended (General, Supplementary, and other Conditions, including but not limited to A201-2017, as amended); Contractor's proof of Payment and Performance Bonds and proof of insurance; all sections of the Project Manual and Construction Documents, Drawings, Specifications, Geotechnical Reports, Addenda issued prior to receipt of bids or proposals; other documents listed in this Agreement, and Modifications issued after execution of this Agreement. The Contract Documents form the Contract for Construction (the "Contract"), and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated written agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other thanModifications, appears in Article 9. Any reference to Contract Documents or any documents included in the Contract Documents and/or supplemented for this Project, shall refer to the Contract Documents as amended for this Project. This Agreement may not be amended or revised except by written agreement signed by the Owner and Contractor.

"Construction Documents" means: all Drawings, specifications, submittals, transmittals, deliverables, instructions to Contractors, and other documents, including those in electronic form, prepared by the Architect and the Architect's consultants and which set forth in detail the requirements for construction of the Project.

§ 1.2 This Agreement represents the entire and integrated agreement between the Owner and the Contractor and supersedes all prior negotiations, representations or agreements, either written or oral. Any revision, amendment, or modification to the Standard Form of this Agreement shall be valid, binding, and enforceable only if said revision, amendment or modification is made conspicuous by being underlined, lined-through, or highlighted in this Agreement signed by Contractor and the authorized representative of Owner's Board of Trustees. In the event of conflict, terms and conditions contained in the Agreement shall take precedence over terms and conditions contained in the General Conditions and the terms and conditions in the General Conditions shall take precedence over all other terms and conditions contained in the other Contract Documents. If the Request for Proposals and the Proposal are included in the Contract Documents, then the Request for Proposals shall take precedence over the Proposal, unless specifically agreed otherwise herein.

§ 1.3 The Board of Trustees, by majority vote, is the only representative of the Owner, an independent school district, having the power to enter into or amend a contract, to approve changes in the scope of the Work, to approve and execute a Change Order or Construction Change Directive modifying the Contract Sum, or to agree to an extension to the date of Substantial or Final Completion or to terminate a contract. The Owner designates the following as the individual authorized to sign documents on behalf of the Board of Trustees, following appropriate Board action: *(insert name and title of designee)* _____, or other Board designee.

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§ 1.4 The Board designates the authorized representatives identified in Paragraph 8.3 to act on its behalf in other respects.

ARTICLE 2 THE WORK OF THIS CONTRACT

Unless otherwise provided in these Contract Documents, the Contractor shall be responsible for performing or causing to be performed all Work including labor and materials, necessary to build, construct, erect and equip in accordance with the Contract Documents except to the extent specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:
(Check one of the following boxes.)

[« »] The date of this Agreement.

[« X »] A date set forth in a notice to proceed issued by the Owner.

The Agreement, including Conditions of the Contract, as well as all other Contract Documents that require signature of the Parties, including the A201-2017, as amended, must be signed first by the Contractor's representative. The Contractor shall have five days from receipt of the documents requiring signature from the Owner to sign the Agreement and all other Contracts requiring signature to return to the Owner the signed documents along with proof of insurance and the Payment and Performance bonds. Once Owner has approved of the Contracts and the proof of insurance and the Payment and Performance bonds, Owner shall sign the Agreement and all other Contract Documents requiring signature of the parties. When Owner has signed and approved all required documents, District shall issue a Notice to Proceed to Contractor.

[« »] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

»

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall diligently prosecute and achieve Substantial Completion of the entire Worknot later than the Substantial Completion Date. The period for reaching the Substantial Completion Date shall begin to run from the Commencement Date and shall not include the Commencement Date. For additions and renovations the Substantial Calculation Date shall be established with the number of calendar days required to substantially complete the work, unless otherwise provided. For new schools the Substantial Completion Date shall be a specific date, unless otherwise provided.

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents,

Portion of Work	Substantial Completion Date
Full	<<NTP + X CALENDAR DAYS>>

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

ARTICLE 4 CONTRACT SUM

§ 4.1 Subject to additions and deletions and other provisions in the Contract Documents, the Owner agrees to pay the Contractor for the Contractor's performance of the contract the following amount for construction and completion of the Work: **XXXXX DOLLARS AND XX CENTS** ($ 0.00).

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§ 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item	Price
See Exhibit "A" attached	

§ 4.2.2 [Paragraph Deleted].

§ 4.3 Allowances, if any, included in the Contract Sum:
(Identify each allowance.)

Item	Price
See Exhibit "C" attached	

§ 4.3.1 Owner Controlled Contingency Allowance:
All construction contracts shall contain a contingency allowance. The Owner Controlled Contingency Allowance is to be used only for expenditures which do not require a Change Order. The Owner Controlled Contingency Allowance may be used to pay for changes in the Work, including but not limited to those resulting from hidden or unforeseen conditions. The Owner Controlled Contingency Allowance may be used to pay claims. Use of the Owner Controlled Contingency Allowance must be authorized in advance by the Superintendent of Schools or designee.
XXXXX DOLLARS AND XX CENTS ($ 0.00).

§ 4.4 Unit prices, if any:
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit ($0.00)
See Exhibit "B" attached		

§ 4.5 Liquidated damages, if any:
(Insert terms and conditions for liquidated damages, if any.)« **§ 4.5.1 Substantial Completion.** Time is of the essence in all phases of the Work. It is specifically understood and agreed by and between Owner and Contractor that time is of the essence in the Substantial Completion of the Project and Owner shall sustain damages as a result of Contractor's failure, neglect or refusal to achieve said deadlines. Such damages are, and will continue to be, impracticable and extremely difficult to determine. Execution of this Agreement under these specifications shall constitute agreement by Owner and Contractor that the amounts stated below are the minimum value of the costs and damages caused by failure of Contractor to complete the Work within the allotted or agreed extended times of Substantial Completion, that such sums are liquidated damages and shall not be construed as a penalty, and that such sums may be deducted from payments due Contractor if such delay occurs. It is expressly understood that the said sum per day is agreed upon as a fair estimate of the pecuniary damages which will be sustained by the Owner in the event that the Work is not completed within the agreed time, or within the agreed extended time, if any, otherwise provided for herein. Said sum shall be considered as liquidated damages only and in no sense shall be considered a penalty, said damages being caused by, but not limited to, additional compensation for personnel, attorneys fees, architectural fees, engineering fees, program management fees, inspection fees, storage costs, food service costs, transportation costs, utilities costs, costs of temporary facilities, loss of interest on money, and other increased costs, all of which are difficult to exactly ascertain. Failure to complete the Work within the designated or agreed extended dates of Substantial Completion, shall be construed as a breach of this Agreement. It is expressly agreed as a part of the consideration inducing the Owner to execute this Agreement that the Owner may deduct from any Payment made to the Contractor a sum equal to

XXXXX DOLLARS AND XX CENTS ($ 0.00) **/ Day)**

per day for each and every additional calendar day beyond the agreed date of Substantial Completion.

§ 4.5.2. Final Completion. Timely final completion is an essential condition of this contract. Contractor agrees to achieve final completion of the Work within 60 days of the designated or extended substantial completion date. Final completion means actual completion of the Work, including any extras or Change Orders reasonably required

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or contemplated under the Contract Documents other than warranty work as further defined in the Form of Contractor's Final Completion Notice attached hereto and incorporated herein as **Exhibit "D"**.

»

§ 4.6 Other Allowances, if any, are as follows:
(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

See Exhibit "C" attached

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month.

« »

§ 5.1.3 The Contractor shall concurrently submit monthly Applications for Payment to the Architect and Program Manager on AIA Form G702 for approval. Continuation sheets shall be submitted on AIA Form G703. If the Architect and Program Manager approve the application, then Architect shall submit a Certificate for Payment to the Owner. The Architect and Program Manager may require any additional information deemed necessary and appropriate to substantiate the Application for Payment. Materials that are verified to be on the jobsite or other approved location for use in the Project may also be incorporated into the Application for Payment. The Architect shall have seven (7) days from date of receipt from the Contractor of an Application for Payment to approve or reject all or any part of the Application for Payment. The Owner shall pay the undisputed amounts certified by the Architect and approved by the Program Manager and Owner to the Contractor within _____ (_30__) days of receipt of the Certificate for Payment from the Architect unless otherwise provided in the Contract Documents. Undisputed amounts unpaid after the date on which payment is due shall bear interest pursuant to Texas Government Code Section 2251.025.

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum, less any unused Owner's contingency, among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect and Program Manager may require. This schedule of values, unless objected to by the Architect and Program Manager,shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall indicate the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™–2017, as amended, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

.1 That portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values; and

.2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing.

.3

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

.1 The aggregate of any amounts previously paid by the Owner;

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.2 The amount, if any, for Work that remains uncorrected and for which the Architect and Program Manager has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017, as amended;

.3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;

.4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017, as amended, or amounts certified by the Architect and disputed by the Owner; and

.5 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner shall withhold the following amount, as retainage, from the payment otherwise due:

(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

«_Five Percent (__5__%) »

If Owner is entitled to deduct liquidated damages, or any other damages or amounts provided in the Contract Documents, including clean-up fees, then Owner shall be entitled to deduct such liquidated damages, amounts and fees at any time. If Contractor fails or refuses to complete the Work, or has unsettled claims with Owner, any payment to Contractor shall be subject to deduction for such amounts as the Architect, if applicable, shall determine as the cost for completing incomplete Work and the value of unsettled claims.

§ 5.1.7.1.1 [Paragraph Deleted.]

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:

(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

«NONE. »

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Final Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7.

§ 5.1.8 [Paragraph Deleted.]

§ 5.1.9 Except with the Owner's prior written approval, ~~or as otherwise provided in Section 9.3.2 of the AIA Document A201-2017,~~ the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.1.10 If Contractor fails or refuses to complete the Work, or has unsettled claims with Owner, any payment to Contractor shall be subject to deduction for such amounts as the Architect if applicable, shall determine as the cost for completing incomplete Work and the value of unsettled claims.

§ 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, minus disputed sums, authorized deductions and liquidated damages, shall be made by the Owner to the Contractor after

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct nonconforming Work as provided in Article 12 of AIA Document A201–2017 as amended, and to satisfy other requirements, if any, which extend beyond final payment;

.2

.3 a final Certificate for Payment has been issued by the Architect and approved by the Program Manager; and

4. Dallas ISD Board of Trustees has voted to accept the Work and approve the Final Payment.

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§ 5.2.2 The Owner's final payment of undisputed sums to the Contractor shall be made no later than 30 days after Dallas ISD Board of Trustees' vote approving Final Payment.

§ 5.3 Interest
Payments due and unpaid under the Contract shall bear interest pursuant to Texas Government Code Section 2251.025.

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1
All disputes relating to this Agreement shall be resolved pursuant to the terms of Article 15 of the AIA Document A201~~2017~~, as amended.

§ 6.2 [Paragraph Deleted]

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA DocumentA201-2017 as amended.

§ 7.1.1 [Paragraph Deleted]

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201- 2017 as amended.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201-2017 as amended or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative is the Superintendent of Schools or the Superintendent's designee:
(Name, address, and other information)

<<Insert DPM Name>>
Dallas Independent School District
3801 Herschel Avenue
Dallas, Texas 75219
(###) ###-#### (Phone)
<<Email: XXXXXXX @dallasisd.org>>

§ 8.3 The Contractor's representative:
(Name, address, email address, and other information)

<<GC Representative Name>>
<<GC Representative Title>>
<<GC Company Name>>
<<GC Address>>
<<GC City/State/Zip>>
(###) ###-#### (Phone)
<<Email: XXXX@XXX>>

§ 8.4 The Contractor's representative may not be changed without written consent of the District, which shall not be unreasonably withheld.

§ 8.5 Insurance and Bonds
§ 8.5.1 The Contractor shall purchase and maintain insurance as set forth in Article 11 of AIA Document A201™–2017 as amended, ~~Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds,~~ and elsewhere in the Contract Documents.

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§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document ~~A101™–2017 Exhibit A~~ A201™–2017 as amended, and elsewhere in the Contract Documents.

§ 8.6 [Paragraph Deleted]

« »

§ 8.7 Other provisions:

«**§ 8.7.1** This Agreement, in its entirety, is deemed performable in Dallas County, Texas. Any litigation to construe or enforce any term or condition of the Contract Documents shall be brought in the State Courts of Dallas County, Texas. In the event of such litigation, the prevailing party shall be entitled to recover reasonable attorney fees and cost of court.

§ 8.7.2 As a material consideration of the making of this Agreement, the modifications to this Agreement shall not be construed against the maker of said modifications.

§ 8.7.3 Notwithstanding anything to the contrary in this Agreement, or in any document forming a part hereof, there shall be no mandatory arbitration for any dispute arising hereunder

§ 8.7.4 Articles 1.5 and 1.6 of AIA Document A201-2017 as amended shall govern Contractor's use of the Construction Documents

§ 8.7.5 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors. As part of that responsibility, Contractor shall enforce the Owner's alcohol-free, drug-free, tobacco-free, harassment-free and weapon-free policies and zones, which will require compliance with those policies and zones by Contractor's employees, subcontractors, and all other persons carrying out the Contract

§ 8.7.6 Contractor shall require all construction workers, whether Contractor's own forces or the forces of Contractor's subcontractors, to wear identification badges on the front of their persons during all times that they are on Owner's property. Such identification badges shall contain a current photograph and the worker's full name in a typeface large enough to be seen from a reasonable distance

§ 8.7.7 Contractor shall require all construction workers, whether Contractor's own forces or the forces of Contractor's subcontractors, to park their personal motor vehicles on Owner's property only in the parking places designated by the Owner. Any vehicles not parked in the appropriate locations shall be towed at the vehicle owner's sole expense.

§ 8.7.8 Contractor shall follow, and shall require all employees, agents or subcontractors to follow, applicable ordinances of the municipality in which the Project is located. In addition, if not covered by the municipality's tree ordinance, Contractor shall barricade and protect all trees on the Project

§ 8.7.9 Contractor shall institute a theft deterrence program designed to restrict construction worker access to properties of Owner that are currently in use, to maintain supervision of Contractor's and Contractor's subcontractor's forces, and to reimburse the Owner or those persons suffering a theft loss which results from Contractor's forces or Contractor's subcontractor's forces' actions, omissions, or failure to secure the Work or connecting or adjacent property of Owner.

§ 8.7.10 The Contractor may not assign its responsibilities, duties, obligations and rights under this Agreement, without the express written consent of the Owner. This does not prevent Contractor from engaging subcontractors to perform various phases of the Project, but Contractor shall be fully responsible to Owner for the work, actions and omissions of all such subcontractors

§ 8.7.11 This Agreement, in its entirety, shall be binding upon all the parties hereto, their respective successors, heirs, executors, administrators or assigns.

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§ 8.7.12 Execution of this Agreement shall constitute approval and acceptance of all terms, covenants and conditions as modified and contained in the Contract Documents.

§ 8.7.13 This Agreement is subject to all applicable federal and state laws, rules, and regulations. Invalidity of any portion of this Agreement under the laws of the State of Texas or of the United States shall not affect the validity of the remainder of this Agreement.

§ 8.7.14 By signing this Agreement, the undersigned certifies as follows: "Under Section 231.006, Texas Family Code, the vendor or applicant certifies that the individual or business entity named in the contract, bid, or application is not ineligible to receive the specified grant, loan, or payment and acknowledges that this contract may be terminated, and payment may be withheld if this certification is inaccurate."

§ 8.7.15 Unless otherwise noted, terms in this Agreement shall have the same meaning as those in the edition of AIA Document A201-2017, General Conditions of the Contract for Construction, as amended for the Project.

§ 8.7.16 To the extent that any portion of the Work requires a trench excavation exceeding five (5) feet in depth, in accordance with Texas Health and Safety Code Section 756.023(a), the Contractor shall fully comply, and shall require any applicable subcontractor to comply, with:

.1 The Occupational Safety and Health Administration standards for trench safety in effect for the construction of the Work;

.2 The special shoring requirements, if any, of the Owner; and

.3 Any geotechnical information obtained by Owner for use by the Contractor in the design of the trench safety system.

.4 Trench excavation safety protection shall be a separate pay item, and shall be based on linear feet of trench excavated. Special shoring requirements shall also be a separate pay item, and shall be based on the square feet of shoring used. Said cost shall be included within the Contract Sum.

§ 8.7.17 No delay or omission by Owner in exercising any right or power accruing upon the noncompliance or failure of performance by Contractor of any of the provisions of this Agreement shall impair any such right or power or be construed to be a waiver thereof. A waiver by Owner of any of the covenants, conditions or agreements hereof to be performed by Contractor shall not be construed to be a waiver of any subsequent breach thereof or of any other covenant, condition or agreement herein contained.

§8.7.18 Contractor stipulates that Owner is a political subdivision of the State of the Texas, and, as such, enjoys immunities from suit and liability as provided by the constitution and laws of the State of Texas. By entering into this Agreement, Owner does not waive any of its immunities from suit and/or liability, except as otherwise specifically provided herein, and as specifically authorized by law.

§ 8.7.19 By executing this Agreement, Contractor verifies that it does not boycott Israel, and it will not boycott Israel during the terms of this Contract.

§ 8.7.20 Contractor verifies and affirms that it is not a foreign terrorist organization as identified on the list prepared and maintained by the Texas Comptroller of Public Accounts. If Contractor has misrepresented its inclusion on the Comptroller's list, such omission or misrepresentation will void this Contract »

§ 8.7.21 All sums due hereunder are payable in Dallas, Dallas County, Texas.

§ 8.7.22 This Agreement, in its entirety, shall be binding on all the parties hereto, their respective successors, heirs, executors, administrators or assigns.

§ 8.7.23 Execution of this Agreement shall constitute approval and acceptance of all terms, covenants and conditions as modified and contained in the Contract Documents.

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ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

.1 ~~AIA Document A101™–2017,~~ This executed 2017 edition of the Standard Form of Agreement Between Owner and Contractor, AIA Document A101™–2017, as amended.

.2 ~~AIA Document A101™–2017, Exhibit A, Insurance and Bonds~~

.3 ~~AIA Document A201™–2017,~~ The General and Supplementary Conditions are the 2017 edition of the General Conditions of the Contract for Construction, AIA Document A201™–2017, as amended and attached to this Agreement.

« »

.5 Drawings are as follows and are dated MMMMM DD, 20YY unless a different date is shown below:

See Exhibit "F" attached

~~Number~~	~~Title~~	~~Date~~

.6 Specifications are those contained in the Project Manual dated as in subparagraph 9.1.8, and are as follows:

See Exhibit "E" attached

~~Section~~	~~Title~~	~~Date~~	~~Pages~~

.7 Addenda, if any:

Number	Date	Pages
Addendum #1 with associated attachments	MMMM DD, 20YY	1 through XX
Addendum #2 with associated attachments	MMMM DD, 20YY	1 through XX
Addendum #3 with associated attachments	MMMM DD, 20YY	1 through XX

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.8 Other Exhibits:
(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

[« »] AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

« »

[« »] The Sustainability Plan:

Title	Date	Pages

[« »] Supplementary and other Conditions of the Contract are those contained in the Project Manual dated:

Document	Title	Date	Pages
Project Manual	Volumes X & X of X	MMMM DD, 20YY	1 through XX

.9 Other documents, if any, listed below:

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(List here any additional documents that are intended to form part of the Contract Documents. AIA Document ~~A201™–2017~~ A201™–2017 as amended provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of the Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

See Exhibit "G" attached

ARTICLE 10 INSURANCE AND BONDS

The Contractor shall purchase and maintain insurance and provide bonds as set forth in Article 11 of AIA Document A201™–2017 as amended.

This Agreement is entered into as of the day and year first written ~~above.~~ above and shall be executed by the parties in one original document. The original document shall be retained by the Owner. One copy of the original shall be provided to the Contractor and one copy shall be provided to the Program Manager.

DALLAS INDEPENDENT SCHOOL DISTRICT	**<INSERT CONTRACTOR LEGAL NAME>**
OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
<<Insert DISD Signer Name & Title>>	<<Insert GC's Signer Name & Title>>
(Printed name and title)	*(Printed name and title)*

Approved As To Form:

_____

DALLAS ISD LEGAL COUNSEL*(Signature)*_____Date____

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AIA® Document A101™ – 2017 Exhibit A

Insurance and Bonds

This Insurance and Bonds Exhibit is part of the Agreement, between the Owner and the Contractor, dated the « » day of « » in the year « 2022 »
(In words, indicate day, month and year.)

for the following **PROJECT**:
(Name and location or address)

« »
« »

THE OWNER:
(Name, legal status and address)

«Dallas Independent School District, a political subdivision of the State of Texas »
«9400 North Central Expressway »
«Dallas, Texas 75231 »

THE CONTRACTOR:
(Name, legal status and address)

« »
« »
« »

The Architect:
(Name, legal status, address and other information)

« »
« »
« »
« »
« »

TABLE OF ARTICLES

A.1 GENERAL

A.2 OWNER'S INSURANCE

A.3 CONTRACTOR'S INSURANCE AND BONDS

A.4 SPECIAL TERMS AND CONDITIONS

Version 10/27/2022

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

This document is intended to be used in conjunction with AIA Document A201™–2017, General Conditions of the Contract for Construction. Article 11 of A201™–2017 contains additional insurance provisions.

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ARTICLE A.1 GENERAL

The Owner and Contractor shall purchase and maintain insurance, and provide bonds, as set forth in this Exhibit. As used in this Exhibit, the term General Conditions refers to AIA Document A201™–2017, General Conditions of the Contract for Construction.

ARTICLE A.2 OWNER'S INSURANCE

§ A.2.1 General

Prior to commencement of the Work, the Owner shall secure the insurance, and provide evidence of the coverage, required under this Article A.2. The copy of the policy or policies provided shall contain all applicable conditions, definitions, exclusions, and endorsements.

§ A.2.2 Liability Insurance

The Owner shall be responsible for purchasing and maintaining the Owner's usual general liability insurance.

§ A.2.3 Required Property Insurance

§ A.2.3.1 Contractor shall provide builder's risk insurance as required in A.3.3.2.1.

§ A.2.3.1.1 -

*(**NOT USED** Indicate below the cause of loss and any applicable sub-limit.)*

Causes of Loss	Sub-Limit
«N/A »	

§ A.2.3.1.2

*(**NOT USED** Indicate below type of coverage and any applicable sub-limit for specific required coverages.)*

Coverage	Sub-Limit
«N/A »	

§ A.2.3.1.3

§ A.2.3.1.4

§ A.2.3.2 Occupancy or Use Prior to Substantial Completion. The Owner's occupancy or use of any completed or partially completed portion of the Work prior to Substantial Completion shall not commence until the insurance company or companies providing the insurance under Section A.3.3.2.1 have consented in writing to continuance or replacement of coverage. The Owner and the Contractor shall take no action with respect to partial occupancy or use that would cause cancellation, lapse, or reduction of insurance, unless they agree otherwise in writing.

§ A.2.3.3 Insurance for Existing Structures

If the Work involves remodeling an existing structure or constructing an addition to an existing structure, the Owner may purchase and maintain, until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, property insurance, on a replacement cost basis, protecting the existing structure against direct physical loss or damage from the causes of loss identified in Section A.3.3.2, notwithstanding the undertaking of the Work. The Owner shall be responsible for all co-insurance penalties.

§ A.2.4

*(**NOT USED** Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. For each type of insurance selected, indicate applicable limits of coverage or other conditions in the fill point below the selected item.)*

[« »] **§ A.2.4.1**

« »

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User Notes: (3B9ADA37)

[« »] **§ A.2.4.2**

« »

[« »] **§ A.2.4.3**

« »

[« »] **§ A.2.4.4**

« »

[« »] **§ A.2.4.5**

« »

[« »] **§ A.2.4.6**

« »

[« »] **§ A.2.4.7**

« »

§ A.2.5 Other Optional Insurance.

The Owner may purchase and maintain the insurance selected below.

(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance.)

[« »] **§ A.2.5.1 Cyber Security Insurance** for loss to the Owner due to data security and privacy breach, including costs of investigating a potential or actual breach of confidential or private information. *(Indicate applicable limits of coverage or other conditions in the fill point below.)*

« »

[« »] **§ A.2.5.2 Other Insurance**

(List below any other insurance coverage to be provided by the Owner and any applicable limits.)

Coverage	Limits
« »	

ARTICLE A.3 CONTRACTOR'S INSURANCE AND BONDS

§ A.3.1 General

§ A.3.1.1 Certificates of Insurance. The Contractor shall provide certificates of insurance acceptable to the Owner evidencing compliance with the requirements in this Article A.3 at the following times: (1) at least five business days after execution of the Contract documents and prior to commencement of the Work; (2) upon renewal or replacement of each required policy of insurance; and (3) upon the Owner's written request. An additional certificate evidencing continuation of commercial liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment and thereafter upon renewal or replacement of such coverage until the expiration of the periods required by Section A.3.2.1 and Section A.3.3.1. The certificates will show the Owner as an additional insured on all of Contractor's insurance policies, except Contractor's workers compensation insurance. These certificates and the insurance policies required by this Article shall contain a provision that coverages afforded under the policies will not be canceled, reduced, or restricted for any reason, other than nonpayment of premium, until at least 30 days' prior written notice of such cancellation, reduction, or restriction has been given to the Owner and Contractor. An additional certificate, policy, and endorsement evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 of the AIA A201-2017 General Conditions as amended for the Project, and thereafter upon renewal or replacement of such coverage. Information concerning reduction or restriction of

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coverage on account of revised limits or claims paid under the General Aggregate, or cancellation or expiration of the insurance shall be furnished by written notice to the Owner from the Contractor within three business days of the date Contractor knew or should have known of the cancellation, reduction, or restriction. At least 30 calendar days prior to the date of expiration of any required insurance policy. Contractor shall provide Owner written notice of the impending expiration. In addition, Contractor shall also provide copies of all policies, declarations, and endorsements for such insurance to Owner as required by Section 11.0.2 of the 2017 AIA A201 General Conditions as amended for this Project.

§ A.3.1.2 Deductibles and Self-Insured Retentions. The Contractor shall disclose to the Owner any deductible or self-insured retentions applicable to any insurance required to be provided by the Contractor. If the insurance required by this Section A.3.1 is subject to deductibles or self-insured retentions, the Contractor shall be responsible for all loss not covered because of such deductibles or retentions. For any claim made against the Contractor's policies of insurance, the deducible shall not exceed $2,500 for Contract Sum (or Guaranteed Maximum Price, if the Project is a Construction Manager at Risk project) of less than $4 million. For a Contract Sum (or Guaranteed Maximum Price, if the Project is a Construction Manager at Risk project), of $4 million or more, the deductible shall not exceed $5,000.

§ A.3.1.3 Additional Insured Obligations. To the fullest extent permitted by law, the Contractor shall cause the commercial general liability coverage and any other insurance required by the Agreement, with the exception of Workers' Compensation insurance, to be endorsed to include (1) the Owner, the Architect, and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations. To the extent commercially available, the additional insured coverage shall be no less than that provided by Insurance Services Office, Inc. (ISO) forms CG 20 10 07 04, CG 20 37 07 04, and, with respect to the Architect and the Architect's consultants, CG 20 32 07 04.

§ A.3.2 Contractor's Required Insurance Coverage

§ A.3.2.1 The Contractor and the Contractor's subcontractors shall purchase and maintain such insurance as will protect them and the Owner from claims which may arise out of, or result from, the Contractor's operations under the Contract whether such operations be by Contractor or by any Subcontractor, or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them maybe liable, in the following types and limits of insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. *(See also the insurance requirements included in Article 11 of the AIA A201-2017 General Conditions as amended for this Project).* The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions.

*(**DO NOT USE** If the Contractor is required to maintain insurance for a duration other than the expiration of the period for correction of Work, state the duration.)*

The insurance required by this Section shall be written for not less than the limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents. The limits of liability for such insurance shall be in at least the following amounts as specified below.

*(NOTE: Amounts of insurance coverage have been left blank so that Districts can enter the appropriate amounts for their Projects. **DO NOT LEAVE ANY BLANK UNFILLED IF THAT COVERAGE IS REQUIRED OR CHOSEN FOR THE PROJECT**. If a particular coverage will not be used for the Project, delete the unused section. If the District has questions on the appropriate amounts or types of coverage, it is strongly suggested that the District contact its legal counsel and insurance agent.)*

« »

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§ A.3.2.2 Commercial General Liability

§ A.3.2.2.1 Commercial General Liability insurance for the Project written on an occurrence form with policy limits of not less than « One Million Dollars and no/100» ($ « 1,000,000 ») each occurrence, « Two Million Dollars and no/100 » ($ « 2,000,000 ») general aggregate, and « Two Million Dollars and no/100 » ($ « 2,000,000 ») aggregate for products-completed operations hazard, providing coverage for claims including

.1 damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person, with a sublimit not less than $5,000 for medical expenses per person for bodily injury, included within the limits noted above;

.2 personal injury and advertising injury with a limit not less than $1,000,000, $2,000,000 aggregate;

.3 damages because of physical damage to or destruction of tangible property, including the loss of use of such property;

.4 bodily injury or property damage arising out of the Work and out of completed operations, said coverage to be maintained for five years after Final Completion (to be maintained for a period of five years after Final Payment; Contractor shall continue to provide evidence of such coverage to Owner on an annual basis during this period and Owner shall be named by endorsement as an Additional Insured for such coverage) and must include Completed Operations coverage for Contractor, its sub-contractors, and Owner;

.5 the Contractor's contractual liability, including but not limited to, indemnity obligations under Section 3.18 of the General Conditions; and

.6 General Aggregate per Project endorsement.

§ A.3.2.2.2 The Contractor's Commercial General Liability policy under this Section A.3.2.2 shall not contain an exclusion or restriction of coverage for the following:

.1 Claims by one insured against another insured, if the exclusion or restriction is based solely on the fact that the claimant is an insured, and there would otherwise be coverage for the claim.

.2 Claims for property damage to the Contractor's Work arising out of the products-completed operations hazard where the damaged Work or the Work out of which the damage arises was performed by a Subcontractor.

.3 Claims for bodily injury other than to employees of the insured.

.4 Claims for indemnity under Section 3.18 of the General Conditions arising out of injury to employees of the insured.

.5 Claims or loss excluded under a prior work endorsement or other similar exclusionary language.

.6 Claims or loss due to physical damage under a prior injury endorsement or similar exclusionary language.

.7 Claims related to residential, multi-family, or other habitational projects, if the Work is to be performed on such a project.

.8 Claims related to roofing, if the Work involves roofing.

.9 Claims related to exterior insulation finish systems (EIFS), synthetic stucco or similar exterior coatings or surfaces, if the Work involves such coatings or surfaces.

.10 Claims related to earth subsidence or movement, where the Work involves such hazards.

.11 Claims related to explosion, collapse and underground hazards, where the Work involves such hazards.

A.3.2.2.3 Coverage will include:

Independent Contractors
Premise operations
Defense costs in addition to the limits
X, C, and U coverage
Broad form property damage including products/completed operations.

Contractual Liability sufficient to cover indemnity requirements in Section 3.18.1, subject to, policy terms and conditions

Contractor's Professional Liability endorsement CG 22 79 or equivalent (policy shall not contain a professional liability exclusion for "means and methods")

Additional insured, primary and non-contributing

If the additional insured endorsement maintained by the Contractor does not include completed operations coverage then the Contractor must purchase this coverage using form CG-20-37 (latest edition) or an equivalent form providing additional insureds with coverage for "completed operations".

Waiver of subrogation in favor of Owner, Program Manager and Architect

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A standard ISO CGL 2001 occurrence coverage form or equivalent
No modification or restriction of the standard ISO CGL coverage form Paragraph I – "damage to your work" exclusion. The "subcontractor exception" will not be removed via CG 22 94.
If there is work within fifty (50) feet of a railroad, endorse with CG 2417.

§ A.3.2.3 Automobile Liability covering vehicles owned, and non-owned, hired, or any other vehicles used, by the Contractor, with policy limits of not less than « » ($ « ») than those stated below per accident, for bodily injury, death of any person, and property damage arising out of the ownership, maintenance and use of those motor vehicles along with any other statutorily required automobile coverage. (*Note: Texas statutory minimum for school districts is $100,000 per person, $300,000 per occurrence, and $100,000 property damage.)* Such minimum limits shall be stated as follows, or in a combined single limit policy in the amount of at least $1,000,000.

.1	Bodily Injury (per person)	$300,000
.2	Bodily Injury (per accident)	$300,000
.3	Property Damage	$300,000

Business Automobile Liability (including owned, non-owned, hired, or borrowed vehicles);

Combined single limit $300,000

Coverage will include:
Contractual Liability
Additional insured, primary and non-contributing
Waiver of subrogation in favor of Owner, Program manager, and Architect
Pollution liability which includes upset, overturn, and collision
Motor Carrier Act Endorsement (MCS 90), if applicable.

§ A.3.2.4 The Contractor may not achieve the required limits and coverage for Commercial General Liability and Automobile Liability through a combination of primary and excess or umbrella liability insurance In no event shall any excess or umbrella liability insurance provide narrower coverage than the primary policy. The excess policy shall not require the exhaustion of the underlying limits only through the actual payment by the underlying insurers.

A.3.2.4.1 Umbrella Excess Liability coverages shall be in at least the following amounts:

.1	$	each occurrence
.2	$	aggregate
.3	Aggregate Per Project Endorsement	

Limits as follows:

If Contract Sum is $1,000,000 or less
$1,000,000 each occurrence and $2,000,000 annual aggregate

If Contract Sum is greater than $1,000,000 up to $5,000,000
$5,000,000 each occurrence and annual aggregate

If Contract Sum is greater than $5,000,000 up to $10,000,000
$10,000,000 each occurrence and annual aggregate

If Contract Sum is greater than $10,000,000 to $25,000,000
$25,000,000 each occurrence and annual aggregate

If Contract Sum is greater than $25,000,000
$50,000,000 each occurrence and annual aggregate

Coverage will include:
Occurrence based form

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Follow form of the primary coverage (commercial general liability, employer's liability, auto liability) except for per project aggregate
Pay on behalf wording
Completed Operations
Waiver of subrogation to follow form of the primary
Additional insured to follow form of the primary
Annual aggregate limit
A drop down feature

§ A.3.2.5 Workers' Compensation .

.1	State:	Statutory Benefits
.2	Employer's Liability	$500,000 per accident $500,000 disease, policy limit $ 500,000 disease, each employee

Coverage will include:

Waiver of subrogation in favor of Owner, Program Manager and Architect
Alternate Employers Endorsement, if applicable
Voluntary Compensation endorsement
All States coverage on an "if any" basis

A.3.2.5.1 Texas Workers' Compensation Insurance. A copy of a certificate of insurance, a certificate of authority to self-insure issued by the Texas Department of Insurance (TDI), or a coverage agreement (DWC-81, DWC-82, DWC-83, or DWC-84), showing statutory worker's compensation insurance coverage for the Contractor's employees providing services on a Project is required for the duration of the Project.

A.3.2.5.1.1 Duration of the Project include the time from the beginning of the Work on the project until the Contractor's Work on the Project has been completed and accepted by the Owner.

A.3.2.5.1.2 Persons providing services on the Project ("subcontractor" in Texas Labor Code Section 406.096) include all persons or entities performing all or part of the services the Contractor has undertaken to perform on the Project, regardless of whether that person has employees. This includes, without limitation, independent contractors, subcontractors, leasing companies, motor carriers, owner-operations, employees of any such entity, or employees of any entity that furnishes persons to provide services on the Project.

A.3.2.5.1.3 Services include, without limitation, providing, hauling or delivering equipment or materials, or providing labor, transportation, or other services related to the Project. Services do not include activities unrelated to the Project, such as food/beverage vendors, office supply deliveries, and delivery of portable toilets.

A.3.2.5.1.4 The Contractor shall provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code 401.011(44) for all employees of the Contractor providing services on the Project for the duration of the Project.

A.3.2.5.1.5 The Contractor must provide a certificate of coverage to the Owner prior to being awarded the Contract.

A.3.2.5.1.6 If the coverage period shown on the Contractor's current certificate of coverage ends during the duration of the Project, the Contractor must, prior to the end of the coverage period, file a new certificate of coverage with the Owner showing that coverage has been extended.

A.3.2.5.1.7 The Contractor shall obtain from each person providing services on the Project, and provide to the Owner:

.1 A certificate of coverage, prior to that person beginning work on the Project, so the Owner will have, on file, certificates of coverage showing coverage for all persons providing services on the Project; and

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.2 No later than seven days after receipt by the Contractor, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the Project.

A.3.2.5.1.8 The Contractor shall retain all required certificates of coverage for the duration of the Project and for five year thereafter.

A.3.2.5.1.9 The Contractor shall notify the Owner, in writing by certified mail or personal delivery, within ten (10) days after Contractor knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the Project.

A.3.2.5.1.10 The Contractor shall post on each Project site a notice, in the text form and manner prescribed by the TDI, informing all persons providing services on the Project that they are required to be covered, and stating how a person may verify coverage and report lack of coverage.

A.3.2.5.1.11 The Contractor shall contractually require each person with whom it contracts to provide services on the Project to:

.1 Provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the stator requirements of Texas Labor Code 401.011(44) for all of its employees providing services on the Project for the duration of the Project:

.2 Provide to the Contractor, prior to that person beginning work on the Project, a certificate of coverage showing that coverage is being provided for all employees of the person providing services on the project for the duration of the Project;

.3 Provide the Contractor, prior to the end of the coverage period, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the Project;

.4 Obtain from each other person with who it contracts, and provide to the Contractor:

.1 A certificate of coverage, prior to the other person beginning work on the Project; and
.2 A new certificate of coverage showing extension of coverage, prior to the end of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the Project.

.5 Retain all required certificates of coverage on file for the duration of the Project and for five years thereafter;

.6 Notify the Owner in writing by certified mail or persona delivery, within ten (10) days after the person knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the Project; and

.7 Contractually require each person with whom it contracts to perform as required by items 1 - 6, with the certificates of coverage to be provided to the person for whom they are providing services.

A.3.2.5.1.12 By signing this Contract or providing or causing to be provided a certificate of coverage, the Contractor is representing to the Owner that all employees of the Contractor who will provide services on the Project will be covered by worker's compensation coverage for the duration of the Project, that the coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier, or, in the case of a self-insured, with the TDI's Division of Self-Insurance Regulation. Providing false or misleading information may subject the Contractor to administrative penalties, criminal penalties, civil penalties, or other civil actions.

A.3.2.5.1.13 The Contractor's failure to comply with any of these provisions is a breach of contract by the Contractor that entitles the Owner to declare the Contract void if the Contractor does not remedy the breach within ten (10) days after receipt of notice of breach from the Owner.

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A.3.2.5.1.14 The coverage requirement recited above does not apply to sole proprietors, partners, and corporate officers who are excluded from coverage in an insurance policy or certificate of authority to self-insure that is delivered, issued or delivery, or renewed on or after January 1, 1996.

28 TAC § 110.110(i).

§ A.3.2.6 Employers' Liability with policy limits not less than « Five Hundred Thousand Dollars and no/100» ($ « 500,000 ») each accident, « Five Hundred Thousand Dollars and no/100 » ($ « 500,000 ») each employee, and « Five Hundred Thousand Dollars and no/100» ($ « 500,000») policy limit.

§ A.3.2.7

§ A.3.2.8 If the Contractor is required to furnish professional services as part of the Work, the Contractor shall procure Professional Liability insurance covering performance of the professional services, with policy limits of not less than « One Million Dollars and no/100 » ($ « 1,000,000 ») per claim and « One MIllion Dollars and no/100 » ($ « 1,000,000 ») in the aggregate. Contractor's Professional Liability, if applicable:

If the Work performed by the Contractor or its subcontractors will include some responsibility for design, the Contractor will purchase or cause to be purchased and maintained a professional liability policy. The limits of coverage will not be less than:

Coverage will include:

A waiver of subrogation in favor of Owner, Program Manager and Architect
A retroactive date that is the earlier of the start of design or the Work
Coverage for negligent acts, errors or omissions arising out of design or engineering services
An extended reporting period of 5 years after final completion

§ A.3.2.9 If the Work involves the transport, dissemination, use, or release of pollutants, the Contractor shall procure Pollution Liability insurance, with policy limits of not less than « Three Million Dollars and no/100 » ($ « 3,000,000 ») per claim and « Three Million Dollars and no/100 » ($ « 3,000,000 ») in the aggregate

Contractors Pollution Liability, if applicable Contractor will purchase a policy covering third-party bodily injury, property damage, and loss of use claims, including clean-up costs, as a result of pollution conditions arising from contractor's operations and completed operations. Completed operations coverage will remain in effect through annual renewal for no less than 5 years after final completion of the Work. The limits of coverage will be not less than:

Coverage will include:

Mold and other fungi and bacteria
No exclusion for EIFS, if applicable
Additional insured, primary and non-contributing
A waiver of subrogation in favor of Owner, Program Manager and Architect
A retroactive date no later than the start of the Work, if applicable.
Occurrence form, if available.

§ A.3.2.10 Coverage under Sections A.3.2.8 and A.3.2.9 may be procured through a Combined Professional Liability and Pollution Liability insurance policy, with combined policy limits of not less than « Four Million Dollars and no/100 » ($ « 4,000,000 ») per claim and « Four Million Dollars and no/100 » ($ « 4,000,000 ») in the aggregate.

§ A.3.2.11 « » ($ « ») « » ($ « »)

§ A.3.2.12 Insurance for the use or operation of manned or unmanned aircraft, if the Work requires such activities, with policy limits of not less than « Ten Million Dollars and no/100 » ($ « 10,000,000 ») per claim and « Ten Million Dollars and no/100 » ($ « 10,000,000 ») in the aggregate.

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§ A.3.3 Contractor's Other Insurance Coverage

§ A.3.3.1 Insurance selected and described in this Section A.3.3 shall be purchased from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. Contractor's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:

(If the Contractor is required to maintain any of the types of insurance selected below for a duration other than the expiration of the period for correction of Work, state the duration.)

« »

§ A.3.3.2 The Contractor shall purchase and maintain the following types and limits of insurance in accordance with Section A.3.3.1.

(Select the types of insurance the Contractor is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. Where policy limits are provided, include the policy limit in the appropriate fill point.)

[« X »] **§ A.3.3.2.1** Builder's Risk Property insurance in the amount of the Contract Sum which, if selected in this section A.3.3.2.1, relieves the Owner of the responsibility to purchase and maintain such insurance except insurance required by Section A.2.3.1.3 and Section A.2.3.3. The Contractor shall disclose to the Owner the amount of any deductible, and the Contractor shall be responsible for losses within the deductible. The Contractor shall provide the Owner with a copy of the property insurance policy or policies required. The Owner shall adjust and settle the loss with the insurer and be the trustee of the proceeds of the property insurance in accordance with Article 11 of the General Conditions unless otherwise set forth below:

(DO NOT USE) *Where the Contractor's obligation to provide property insurance differs from the Owner's obligations as described under Section A.2.3, indicate such differences in the space below. Additionally, if a party other than the Owner will be responsible for adjusting and settling a loss with the insurer and acting as the trustee of the proceeds of property insurance in accordance with Article 11 of the General Conditions, indicate the responsible party below.)*

.1 **Builder's Risk.** Unless otherwise provided, Contractor shall purchase and maintain, from an insurance company or insurance companies lawfully authorized to issue insurance in the state of Texas, a property insurance written on builder's risk "all-risks" completed value or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis, including boiler and machinery insurance, Coverage, if not included in the base coverage, shall include coverage against the perils of fire, (with extended coverage) and physical loss or damage including, without limitation or duplication of coverage, lightning, collapse, earthquake, flood, wind storm, hurricane, hail, explosion, riot, civil commotion, smoke, aircraft, land vehicles, theft, vandalism, malicious mischief, falsework, testing and start-up, temporary buildings, debris removal including demolition occasioned by enforcement of any applicable legal requirements, and all other perils, and shall include materials stored on-site, off-site, and in transit. The Contractor's property insurance coverage shall be no less than the amount of the initial Contract Sum, plus the value of subsequent Modifications and labor performed and materials or equipment supplied by others. The property insurance shall be maintained until Final Completion, unless otherwise provided in the Contract Documents or otherwise agreed in writing by the parties to this Agreement. This insurance shall include the interests of the Owner, Contractor, Subcontractors, and Sub-subcontractors in the Project as insureds. This insurance shall include the interests of mortgagees as loss payees. Such coverage shall be primary coverage.

.2 **Causes of Loss.** The insurance required by this Section A.3.3.2.1 shall provide coverage for direct physical loss or damage, and shall not exclude the risks of fire, explosion, theft, vandalism, malicious mischief, collapse, earthquake, flood, or windstorm. The insurance shall also provide coverage for ensuing loss or resulting damage from error, omission, or deficiency in construction methods, design, specifications, workmanship, or materials. Sub-limits, if any, are as follows:

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(*Indicate below the cause of loss and any applicable sub-limit.*)

.3 Causes of Loss Sub-Limit. Specific Required Coverages. The insurance required by this Section A.3.3.2.1 shall provide coverage for loss or damage to falsework and other temporary structures, and to building systems from testing and startup. The insurance shall also cover debris removal, including demolition, occasioned by enforcement of any applicable legal requirements, and reasonable compensation for the Architect's and Contractor's services and expenses required as a result of such insured loss, including claim preparation expenses. Sub-limits, if any, are as follows: (*Indicate below type of coverage and any applicable sub-limit for specific required coverages.*)

.4 Adjustment of Loss. The Owner, as a fiduciary, shall have power to adjust and settle any loss arising out of the Work, with insured, regardless of the purchaser of the insurance policy. The Contractor, upon receipt of proceeds, shall as fiduciary, pay all subcontractors their just shares of insurance proceeds received by the Contractor, and, by appropriate agreements, shall require subcontractors to make payment to their sub-subcontractors in similar manner. The Owner shall deposit, in a separate account, proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, then replacement of damaged property shall be performed by the Contractor with the insurance proceeds upon issuance of a Notice to Proceeds from the Owner.

.5 Occupancy or Use Prior to Substantial Completion. The Owner's occupancy or use of any completed or partially completed portion of the Work prior to Substantial Completion shall not commence until the insurance company or companies providing the insurance under Section A.3.3.2.1 have consented, in writing, to the continuance of coverage. The Owner and the Contractor shall take no action with respect to partial occupancy or use that would cause cancellation, lapse, or reduction of insurance, unless they agree otherwise in writing.

.6 Employee Theft or Dishonesty. If this Builder's Risk policy excludes Employee Theft or Dishonesty coverage, including Third Parties, Contractor shall obtain separate coverage sufficient to protect Owner's interest and in an amount agreeable to Owner.

.7 Cancellation. The insurance policies required by this Section A.3.3.2 shall contain a provision that coverages afforded under the policies will not be canceled for any reason, other than nonpayment of premium, or reduced or restricted due to a material change in coverage until at least 30 days prior written notice of such cancellation or material change has been given to the Owner. Contractor shall provide Owner 30 days prior written notice of the expiration of any policy required by Section A.3.1.1.

.8 Construction Manager at Risk. If Contractor is a Construction Manager at Risk. Then, as specified in each AIA A133 Exhibit A Amendment, the amount of Builder's Risk insurance coverage shall be an amount equal to the Guaranteed Maximum Price; otherwise, in the total amount of the Contract Sum.

.9 Deductibles. For any claim made against the builder's risk insurance, the deductible shall not exceed $2,500 for a Contract Sum (or Guaranteed Maximum Price, if the Project is a Construction Manager at Risk project), of less than $4 million. For a Contract Sum (or Guaranteed Maximum Price, if the project is a Construction Manager at Risk project), of $4 million or more, the deductible shall not exceed $5,000. Contractor shall be responsible for losses within such deductible amounts.

« »

[« »] **§ A.3.3.2.2** « » ($ « ») « » ($ « »)

[« »] **§ A.3.3.2.3** « » ($ « ») « » ($ « »)

[« »] **§ A.3.3.2.4** Insurance for physical damage to property while it is in storage and in transit to the

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construction site on an "all-risks" completed value form.

[« »] **§ A.3.3.2.5**

[« »] **§ A.3.3.2.6 Other Insurance**
(List below any other insurance coverage to be provided by the Contractor and any applicable limits.)

Coverage	**Limits**
« »	

§ A.3.4 Performance Bond and Payment Bond
The Contractor shall provide surety bonds, from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located, subject to the requirements of A201-2017, Article 11.1.2.1, as follows:
(Specify type and penal sum of bonds.)

Type	Penal Sum ($0.00)
Payment Bond	«$ or 100% of the Contract Sum as amended
Performance Bond	$ or 100% of the Contract Sum as amended»

The form of Payment and Performance Bonds shall be subject to the requirements of Texas law, current as of the date of this Agreement.

ARTICLE A.4 SPECIAL TERMS AND CONDITIONS
Special terms and conditions that modify this Insurance and Bonds Exhibit, if any, are as follows:

« See A201-2017, Article 11 »

This Agreement entered into as of the day and year first written above.

_____	_____
OWNER	CONTRACTOR
Dallas Independent School District	

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General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)

BP# XXX: ORG #XXX XX Elementary School
School Address
Dallas, Texas 75XXX

THE OWNER:
(Name, legal status and address)

The Dallas Independent School District, a political subdivision of the State of Texas
9400 North Central Expressway
Dallas, Texas 75231

THE PROGRAM MANAGER:
(Name, legal status and address)

PMF Name
PMF Address
PMF City/State/Zip
«»«»
«»

THE ARCHITECT:
(Name, legal status and address)

A/E Name
A/E Address
A/E City/State/Zip

TABLE OF ARTICLES

1 GENERAL PROVISIONS

2 OWNER

3 CONTRACTOR

4 ARCHITECT ADMINISTRATION OF THE CONTRACT

5 SUBCONTRACTORS

6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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8 TIME

9 PAYMENTS AND COMPLETION

10 PROTECTION OF PERSONS AND PROPERTY

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For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

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11 INSURANCE AND BONDS

12 UNCOVERING AND CORRECTION OF WORK

13 MISCELLANEOUS PROVISIONS

14 TERMINATION OR SUSPENSION OF THE CONTRACT

15 CLAIMS AND DISPUTES

Version 10/27/2022

DRAFT

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents consist of the Contract between Owner and Contractor, A101- 2017, as amended, OR the Contract between the Owner and Construction Manager at Risk A133-2019, as amended, and the A133-2019 Exhibit A (hereinafter the ~~Agreement~~Contract); Conditions of the Contract as amended (General, Supplementary and other Conditions, including but not limited to A201-2017, as amended); Contractor's proof of Payment and Performance Bonds and proof of insurance, ~~are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), all sections of the Project Manual and Construction Documents (as defined in Section 1.1.3 below) including~~ Drawings, Specifications, and Addenda issued prior to receipt of bids or proposals, ~~to execution of the Contract,~~ other documents listed in the ~~Agreement~~Contract, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the ~~Agreement~~Contract, the Contract Documents do not include other documents such as bidding requirements (advertisement or invitation to bid, Instructions to Bidders, sample forms, Contractor's bid or portions of Addenda relating to bidding requirements). All sections of the Project Manual shall be a part of the ~~Agreement~~Contract. In the event of conflict, terms and conditions contained in the ~~Agreement~~Contract, as amended, shall take precedence over terms and conditions contained in the General Conditions, as amended. The terms and conditions in the General Conditions, as amended, shall take precedence over all other terms and conditions contained in the other Contract Documents. ~~Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.~~

1.1.1.1 The Contract, represents the entire and integrated agreement between the Owner and the Contractor and supersedes all prior negotiations, representations, or agreements, either written or oral. Any revision, amendment, or modification to the Standard Form of the Contract shall be valid, binding, and enforceable only if said revision, amendment, or modification is made conspicuous by being underlined, lined-through, or highlighted in this Contract signed by Contractor and the authorized representative of Owner's Board of Trustees.

§ 1.1.2 The Contract

The Contract Documents form the Contract for ~~Construction~~Construction (the "Contract"). The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a written Modification signed by the Contractor, approved by Owner's Board of Trustees, and signed by the representative of the Owner's Board of Trustees who is authorized to sign contracts. As a material consideration for the making of the Contract, modifications to the Contract shall not be constructed against the maker of said modifications. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor of the Contractor;~~,~~ (3) between the Program Manager and the Contractor~~between the Owner and the Architect or the Architect's consultants~~, or (4) between any persons or entities other than the Owner and the Contractor. ~~The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.~~

The Program Manager and/or Architect shall, however, be entitled to performance and enforcement of obligations of the Contractor under the Contract intended to facilitate performance of the duties of the Architect and/or the Program Manager.

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1.1.2.1 To be effective, all Contract Documents including the A201-2017, as amended requiring signatures must be signed first by the Contractor representative and then by the Owner's authorized representative, after approval by Owner's Board of Trustees. If an approved Contact Document requiring Contractor's signature has not been signed, then the missing signature shall be provided within a reasonable period of time. Failure of Contractor to sign an approved Contract Document after notice and a reasonable opportunity to sign, shall be considered a material breach of the Contract by Contractor.

§ 1.1.3 The Work; Construction Documents

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project. The Work includes all labor, parts, supplies, skill, supervision, transportation, services, and other facilities and things necessary, proper or incidental to the carrying out and completion of the terms of the Contract Documents and all other items of cost or value needed to produce, construct and fully complete the public Work identified by the Contract Documents.

"Construction Documents" means: all Drawings, Specifications, geotechnical reports, Addenda, submittals, transmittals, deliverables, instructions to Contractors, and other documents, including those in electronic form, prepared by the Architect and the Architect's consultants and which set forth in detail the requirements for construction of the Project. The Construction Documents shall include Drawings and Specifications that establish, in detail, the quality levels of materials and systems required for the Project. The Construction Documents shall reflect all agreements between Owner and Architect concerning Owner's budgetary constraints, programmatic needs and expectations as to quality, functionality of systems, maintenance costs, and usable life of equipment and facilities. Said Construction Documents shall reflect the Owner's educational program and educational specifications, the State educational adequacy standards in 19 TAC § 61.104~~36~~, and the standards set forth in the Owner's architect agreement ~~Section 3.1.4 of AIA document B101-2017~~. The Architect shall provide Construction Documents which are sufficient for Owner to complete construction of the Project, are free from material defects or omissions, and which shall comply with all applicable laws, ordinances, codes, rules, and regulations, as of the date of issuance of Construction Documents.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner ~~and~~ or by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 ~~Instruments~~ PROJECT MANUAL ~~of Service~~

~~Construction Instru~~Documents ~~of Service are include representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Construction Instru~~Documents ~~of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.~~ The Project Manual is a volume assembled for the Work which may include the bidding requirements, sample forms, Conditions of the Contract and Specifications.

§ 1.1.8 PROGRAM MANAGERS ~~Initial Decision Maker~~

The Owner may use Program Managers to carry out some of the functions of administration of the Owner's construction program. The Contractor, Architect, and Program Manager (when applicable) shall cooperate with each other in the performance of their respective functions. The management and reporting systems used by the Owner and/or Program Manager, including the assignment of the Program Manager, may be changed by Owner during the Project.

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~~The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.~~

1.1.9 Addenda

Addenda are written or graphic instrument issued by the Owner ~~prior to the execution of the Contract~~, which modify or interpret the bidding or proposal documents, including Drawings and Specifications, by additions, deletions, clarifications, or corrections. Addenda will become part of the Contract Documents and Construction Documents when the Contract is executed. The Contractor and subcontractors shall include all addenda items on their copies of the Drawings and Specifications.

1.1.10 All references to "Contractor" shall include "Construction Manager at Risk" as appropriate.

1.1.11 ~~The Owner may retain Program Manager(s) to carry out some of the functions of the administration of the Owner's construction program. The Contractor, Architect, and Program Manager(s) (when applicable) shall cooperate with each other in the performance of their respective functions. The management and reporting systems used by the Owner and/or Program Manager(s) including the assignment of the Program Manager, may be changed by Owner during the Project.~~[Omitted]

1.1.11 Approved, Approved Equal, Approved Equivalents, Or Equal

The terms "Approved" and "Approved Equal" relate to the substitution of materials, equipment, or procedure in writing by the Architect prior to receipt of bids.

1.1.12 Abbreviations

AIA:	American Institute of Architects. (All references to AIA documents refer to AIA's trademarked documents. Each reference to a specific document shall refer to the documents as amended for this Project.)
AIEE:	American Institute of Electrical Engineers
ACI:	American Concrete Institute
AHERA:	Asbestos Hazardous Emergency Response Act
AISI:	American Iron and Steel Institute
AISC:	American Institute of Steel Construction
ANSI:	American National Standards Institute
ASA:	American Standards Association
ASTM:	American Society of Testing Materials
AWSC:	American Welding Society Code
CERCLA:	Comprehensive Environmental Response, Compensation, and Liability Act
EPA:	Environmental Protection Agency
FS:	Federal Specification
NEC:	National Electrical Code
OSHA:	Occupational Safety and Health Administration
SPR:	Simplified Practice Recommendation
TAS:	Texas Accessibility Standards
UL:	Underwriters Laboratories, Inc.

1.1.13 Bids or Bidding The term "Bids" or "Bidding" shall include any kind of competitive purchasing under Texas Government Code Chapter 2269.

1.1.14 Miscellaneous Other Words

1.1.14.1 Business Day

The term "business day" is a day that Owner's Administration Building is scheduled to be open for normal business purposes, unless closed by the Owner's Superintendent of Schools for inclement weather or other reason. Days on which the Administration Building is normally closed are: Thanksgiving Break, Winter Break, Spring Break, and Summer Break, as well as other federal, state, or local days specified in the calendar approved by the Owner's Board of Trustees on an annual basis. A business day does not include a day on which the Owner's Administration Building is open only for the purposes of conducting candidate filing, early voting, elections, or other special events.

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1.1.14.2 Calendar Day
A calendar day is a day on the Gregorian Calendar. The Contract Time is established in calendar days. Extensions of time granted, if any, will be converted to calendar days.

1.1.14.3 Holidays
Owner-approved holidays for Contractor's Work are limited to: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day.

1.1.14.4 Work Day
Work days are all calendar days except Holidays.

1.1.14.5 Anticipated Weather Days
An allowance of regular Work Days, established as anticipated Work Days lost due to weather delays; said allowance shall be included in Contractor's proposed completion time. Only lost weather days in excess of Anticipated Weather Days shall be considered by Owner for time extensions based upon weather. ~~Section 15.1.5.3 lists required Anticipated Weather Days.~~

1.1.15 Contract Sum
"Contract Sum" shall have the same meaning as in Section 5.1 of the Contract (A133-20~~09~~), for the Project when the Project is a Construction Manager at Risk Project OR the same meaning as in Article 4 of the Contract (A101-2017) for the Project.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.1.1 ~~The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.~~ The most recently issued contract document takes precedence over previously issued forms of the same document. Figures given on Drawings govern scale management, and large-scale details govern smaller scale Drawings. If an item is shown one place in the Drawings, but not another, or called for in a schedule or the specifications but not shown on the Drawings or shown on the Drawings but not in a schedule, it is to be included. Existing conditions take precedence over Drawings and Specifications for dimensions.

1.2.1.2 During the course of the Work, should any conflict be found in or between the Contract Documents, the Contractor shall be deemed to have estimated the Work on the basis of the greater quantity or better quality, or the most stringent requirement, unless he shall have obtained an interpretation in writing from the Architect as to what shall govern before the submission of his Proposal. The Architect, in case of such conflict, may interpret or construe the documents so as to obtain the most substantial and complete performance of the Work consistent with the Contract Documents and reasonably inferable therefrom, in the best interest of Owner, and the Architect's interpretation shall be final. The terms and conditions of this clause shall not relieve any part of any other obligation under the Contract Documents.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

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1.2.4 Relation of Specifications And Drawings

General Requirements in the Specifications govern the execution of all Specifications. Summary paragraphs present a brief indication of the Work, but do not limit the Work as later detailed. The Drawings and Specifications are correlative and have equal authority and priority. Should the Drawings and Specifications have internal inconsistencies, then the Contractor shall base the bids and construction on the more expensive combination of quality and quantity of work indicated. For purposes of construction, the Architect shall determine the appropriate Work, after the Contractor brings the inconsistency to the Architect's attention. Failure to report an inconsistency shall be evidence that Contractor has elected to proceed in the more expensive manner.

1.2.5 ~~Optional Materials, Equipment and Processes~~Materials, Equipment, and Processes

Exact location and arrangement of the various pieces of equipment specified shall be determined with the approval of the Architect after equipment has been selected and/or as the Work progresses. All equipment shall, insofar as possible, be installed in such a manner as will not interfere with architectural or structural portions of the building. Should changes become necessary because of a failure of the Contractor to comply with the Contract Documents which results in equipment requiring more area than shown on the Contract Documents, the Contractor shall be fully responsible for completing any required modifications or eliminating any interferences. Where in the Drawings and Specifications, certain products, manufacturer's trade names, or catalog numbers are specified, it is done for the express purpose of establishing a standard of function, dimension, appearance, and quality of design in harmony with the Work, and is not intended for the purpose of limiting competition. Materials or equipment shall not be substituted unless the Architect has specifically accepted such substitution for use on this Project. When more than one material, process, or brand is specified for a particular item of Work, the choice shall be the Contractor's. The final selection of color and pattern will be made by the Owner from the range available within the option selected by the Contractor, unless the item is specified to match a specific color or sample furnished. Where particular items are specified, products of those named manufacturers are required unless Contractor submits for consideration proposed substitutions of materials equipment, or processes from those set out in the Contract Documents. Submittals of proposed substitutions should contain sufficient information to allow the Architect and Owner to determine if the proposed substitution is in fact equal to or better than the requirements in the Contract Documents. The Architect shall review and respond to proposed substitutions within fifteen (15) days of receipt. Contractor shall bear all risk caused by submitting substitutions, including all costs. The Owner may approve substitutions only when the substitution is clearly provided by the Contract to be equal in performance characteristics to the requirements of the Contract Documents, equally compatible with the existing installations and complementary to the architectural design for the Work. Contractor shall bear all related costs associated with the substitution. Certain special construction and equipment details may not be regularly included as part of the named manufacturer's standard catalog equipment, but shall be obtained by the Contractor from the manufacturer as required for the proper evaluation and/or function of the equipment. Reasonable minor variations in equipment are expected and will be acceptable, if approved by the Architect and Owner, however, indicated and specified performance and material requirements are the minimum. The Owner and the Architect reserve the right to determine the quality of equipment and materials that deviate from any of the indicated and specified requirements.

~~1.2.5.1Product and Reference Standards~~

~~When specific products, systems or items of equipment are referred to in the Contract Documents, any ancillary devices which the Contractor knows, or in accordance with the standard of care for a General Contractor should have known, is necessary for proper functioning shall also be provided. When standards, codes, manufacturer's instructions and guarantees are required and no edition is specified by the Contract Documents, the current edition at the time of Contract execution shall apply whether or not the proper edition was set out in the Contract Documents. References to standards, codes, manufacturer's instructions and guarantees shall apply in full, except:~~

~~.1 They do not supersede more stringent standards set out in the Contract Documents, and~~
~~.2 Any exclusions or waivers that are inconsistent with the Contract Documents do not apply.~~

1.2.6 Standards And Requirements

When the Contract Documents refer to standards, building codes, manufacturers' instructions, or other documents, unless otherwise specified, then the current edition as of the date of execution of the Contract by the last party to execute said Contract shall apply. It shall be the responsibility of the Architect to address revisions or amendments to applicable codes or standards which arise after the date of execution of the Contract and until Final Completion, pursuant to the terms of the Contract between Owner and Architect. Requirements of public authorities apply as minimum requirements only and do not supersede more stringent specified requirements.

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General Requirements in the Specifications govern the execution of all Work. Summary paragraphs present a brief indication of the Work, but do not limit the Work as later detailed. Should the Drawings and Specifications have internal inconsistencies, then the Contractor shall base the bids and construction on the most expensive combination of quality and quantity of work indicated. For purposes of construction, the Architect shall determine the appropriate Work, after the Contractor brings the inconsistency to the Architect's attention. Failure to report an inconsistency shall be evidence that Contractor has elected to proceed in the more expensive manner.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles and identified references to Paragraphs, Subparagraphs, and Clauses in the documents., or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 All ownership rights, whether common law, statutory, or other reserved rights, including copyright ownership of the Construction Documents, are controlled by the Contract between the Owner and ~~T~~the Architect ~~and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights~~. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the ~~Instruments of Service~~Construction Documents. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of any~~the Architect's or Architect's consultants'~~ reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are granted a limited license~~authorized~~ to use and reproduce the Construction Documents~~Instruments of Service~~ provided to them, subject to any protocols established pursuant to Section~~s~~ 1.7 ~~and 1.8~~, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Construction Documents~~Instruments of Service~~. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the ~~Instruments of Service~~Construction Documents on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants. All copies of the Construction Documents, except the Contractor's record set, shall be returned or suitably accounted for to the copyright holder upon completion of the Work.

1.5.3 The Drawings, Specifications and other Documents, including those in electronic form, prepared by the Architect and the Architect's consultants are Instruments of Service through which the Work to be executed by the Contractor is described. The Contractor may retain one record set. Neither the Contractor nor any Subcontractor, Sub-subcontractor or material or equipment supplier shall own or claim copyright in the Drawings, Specifications and other documents prepared by the Architect or Architect's consultants, and unless otherwise indicated the Architect and the Architect's consultants shall be deemed the authors of them and will retain all common law, statutory and other reserved rights, in addition to the copyrights. All copies of Instruments of Service, except the Contractor's record set, shall be returned or suitably accounted for to the Architect, on request, upon completion of the Work. The Drawings, Specifications and other documents prepared by the Architect and the Architect's consultants, and copies thereof furnished to the Contractor, are for use solely with respect to this Project. They are not to be used by the Contractor or any Subcontractor, Sub-subcontractor or material or equipment supplier on other projects or for additions to this Project outside the scope of the Work without the written consent of the Owner, Architect and Architect's consultants. The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce applicable portions of the Drawings, Specifications and other documents prepared by the Architect and Architect's consultants appropriate to and for use in the execution of their Work under the Contract Documents. All copies made under this authorization shall bear the statutory copyright notice, if any, shown on the Drawings, Specifications and other documents prepared by the Architect and Architect's consultants. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's or Architect's consultants copyrights or other reserved rights.

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§ 1.6 Notice

§ 1.6.1 ~~Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement~~Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; if delivered at, or sent by registered or certified mail, or by courier service providing proof of delivery to the last business address known to the party giving notice, or if sent by electronic facsimile transmission, to the last business number known to the party giving notice, with electronic confirmation of receipt; or, if sent by electronic mail, to the email address of the Owner's or Contractor's designated representative, with electronic confirmation of receipt.

§ 1.6.2 ~~Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.~~

§ 1.7 Digital Data Use and Transmission

If ~~T~~the parties intend to transmit Construction Documents or any other information or documentation in digital form, they shall endeavor to establish necessary~~shall agree upon~~ protocols governing such~~the~~ transmissions, unless otherwise already provided in the Contract or the Contract Documents ~~and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data~~.

§ 1.8 EXECUTION OF CONTRACT DOCUMENTS

1.8.1 The Contract Documents must be signed by the Owner and Contractor. The ~~Agreement~~Contract between Owner and Contractor, as amended, including Conditions of the Contract, as amended, as well as all other Contract Documents that required signature of the Parties, including the A201-2017, as amended, must be signed first by the Contractor's representative. . After signing the ~~Agreement~~Contract and all other Contract Documents requiring signature, Contractor shall return the Contract Documents along with proof of insurance and payment and performance bonds to Owner. Once Owner has approved of the Contract Documents and the proof of insurance and payment and performance bonds, Owner shall sign the ~~Agreement~~Contract and all other Contract Documents requiring signature of the parties. When Owner has signed and approved all required documents, District shall issue a Notice to Proceed to Contractor.

1.8.2 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents. Should the Contractor find discrepancies, omissions or conflicts within the Contract Documents, or be in doubt as to their meaning, the Contractor shall at once notify in writing the Architect, the Program Manager and Owner, and Architect will issue a written Architect's Supplemental Instruction to all parties that is consistent with the Owner's Scope of the Work.

~~**Building Information Models Use and Reliance**~~

~~**Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.**~~

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the independent school district ~~oe enity~~ ~~person or entity~~ identified ~~as such in the Agreement and is referred to throughout~~ in the Contract Documents ~~as if singular in number~~. The Board of Trustees, by majority vote, is the only representative of the Owner, an independent school district, having the power to: enter into a contract; amend a contract, including but not limited to, AIA Document A133 Exhibit A; approve changes in the scope of the Work; approve and execute a Change Order or Construction Change Directive modifying the Contract Sum or Guaranteed Maximum Price; agree to an extension to the date of Substantial or Final Completion; or terminate a contract. The Board will act as soon as reasonably possible to avoid undue delays. The Board ~~shall~~

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designates authorized representatives to act on its behalf for day-to-day operations under the Contract. Unless otherwise designated in the Contract Documents, Owner's authorized ~~in writing a~~ representative ~~who~~ shall be the Superintendent of Schools, who may delegate responsibilities as appropriate. ~~have express authority to bind the Owner~~ Except as otherwise provided in the Contract Documents, the Architect does not have such authority. Neither Architect nor Contractor may rely upon the direction of any employee of Owner who has not been designated in writing by the Superintendent or Board of Trustees; Owner shall not be financially responsible for actions taken by the Architect or Contractor in reliance upon direction from unauthorized persons ~~with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority~~. ~~The term "Owner" means the Owner or the Owner's authorized representative.~~

§ 2.1.2 ~~The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein~~ It shall be distinctly understood that by virtue of this Contract, no mechanic, contractor, material person, artisan, or laborer, skilled or unskilled, shall ever in any manner have, claim, or acquire any lien upon the buildings or any of the improvements of whatsoever nature or kind so erected or to be erected by virtue of this Contract or upon any of the land on which said buildings of any of the improvements are so erected, built, or situated, such property belonging to a political subdivision of the State of Texas. It shall be further understood that this Contract is not written for the benefit of their parties.

2.1.3 The Owner shall require the Contractor and the Architect to meet periodically at mutually-agreed-upon intervals, for the purpose of establishing procedures to facilitate cooperation, communication, and timely responses among the participants. By participating in this arrangement, the parties do not intend to create additional contractual obligations or modify the legal relationship which may otherwise exist.

2.1.4 The Owner may require that the Contractor use and/or respond to certain Owner-furnished forms or inquiries during the course of the Project. From time to time, there may be future revisions, changes, additions, or deletions to these forms. The fact that the Owner modifies and increases reasonable reporting requirements shall not serve as the basis for a claim for additional time or compensation by the Contractor.

2.1.5 The Contractor stipulates and agrees that the Owner has no duty to discover any design errors or omissions in the Drawings, Plans, Specifications, and other Construction Documents, and has no duty to notify Contractor of same. By entering into the Contract Documents or any Contract with any Architect, Owner does not warrant the adequacy and accuracy of any Drawings, Plans, Specifications, or other Construction Documents.

§ 2.2 ~~Evidence of the~~ Owner's Financial Arrangements

§ 2.2.1 ~~Prior to commencement of the Work and upon written request by the Contractor, t~~The Owner, being a public body under the laws of the State of Texas, must have adequate funds and/or financing as provided by law prior to award and execution of ~~shall furnish to~~ the Contract~~or~~ Documents~~reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately~~.

§ 2.2.2 At any time prior to the Owner's receipt of the executed ~~Agreement~~Contract with the required bonds and insurance, the Owner may, at its sole option and without cause, reject the offer described in this ~~Agreement~~Contract by delivering to the Contractor a written notice stating so. Such notice shall be signed by the Owner's Director of Purchasing or designee and shall be effective on receipt by the Contractor. The rejection of the offer described in this ~~Agreement~~Contract shall cause no obligation or duty to the District save return of bid or proposal security, if any, if rejection is without cause. This paragraph does not pertain to rejection for cause by the Owner, or for the Contractor's failure to provide required bonds or insurance ~~Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until~~

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~~reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.~~

§ 2.2.3 ~~After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.~~

§ 2.2.4 ~~Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.~~

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The "Architect" is the person ~~Owner shall retain an architect~~ lawfully licensed to practice architecture, or an entity lawfully practicing architecture, ~~in the jurisdiction where the Project is located. That person or entity is identified as the Architect~~ identified as such in the ~~Agreement~~Contract and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor ~~to whom the Contractor has no reasonable objection and~~ whose status under the Contract Documents shall be that of the Architect. Owner shall notify Contractor if successor architect has been employed by Owner. The term "Architect" means the Architect or the Architect's authorized representative.

§ 2.3.4 If requested to do so, in writing, by Contractor, prior to start of the Work, ~~T~~the Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. ~~The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.~~ The survey shall not relieve Contractor from its obligations to examine the site, or exercise proper precautions relating to the safe performance of the Work.

§ 2.3.5 Information or services reasonably necessary for the Work and under the Owner's control shall be furnished by the Owner with reasonable promptness where requested in writing by the Contractor. Under normal circumstances, fourteen (14) District Business days will be considered a reasonable time for Owner response. In any circumstance where information or services from the Owner, Program Manager or Architect is required, Contractor shall promptly notify in writing the Architect, with copy to the Program Manager, of the particular need. Absent such notification, any Claim based upon lack of such information or services shall be waived.~~The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services. Absent such timely notification, any Claim based upon lack of such information or services shall be waived.~~

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Construction~~act~~ Documents, as provided for in the Project Manual, for purposes of making reproductions pursuant to Section 1.5.2.

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§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to fails to correct non-conforming or defective Work, fails to correct Work which is not in accordance with Contract Documents, or ~~correct defective Work, fails to correct Work that is not in accordance with the requirements of the Contract Documents or the Construction Documents as required by Section 12.2 or repeatedly~~ fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity~~, except to the extent required by Section 6.1.3~~. The authorized Owner's representative having the legal right to stop the Work shall be limited to the Owner's Superintendent of Schools or designee.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. ~~Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and t~~The Architect ~~may~~shall, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's, Program Manager and other consultants' additional services, if any, made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, then the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, then the Contractor may file a Claim pursuant to Article 15.

2.5.1 After the Work is complete the Owner may make emergency repairs to the Work if necessary to prevent further damage, or if the Contractor does not promptly respond to a notice of a condition requiring repairs. Contractor shall be responsible to Owner for this cost if the reason for the repairs is defects in Contractor's Work. If payments then or thereafter due the Contractor are not sufficient to cover such costs, the Contractor shall pay the difference to the Owner.

2.6 OWNER'S OCCUPANCY

Contractor agrees that the Owner may place and install as much equipment and furnishings during the progress of the building as is possible before completion of various parts of the Work, or may occupy portions of the Work before substantial completion of the entire Work, and further agrees that such placing and installing of equipment and furnishings or occupancy of portions of the Work shall not in any way evidence the substantial completion of the entire Work, or signify Owner's acceptance of the Work, nor does it affect claims for liquidated damages in case Substantial Completion is not achieved as required unless the failure to reach Substantial Completion is the result of the early move-in or occupancy. Owner will accept the responsibility for any damages to the Work caused by such occupancy.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the ~~Agreement~~Contract and is referred to throughout the Contract Documents as if singular in number. ~~The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract.~~ The term "Contractor" means the Contractor or the Contractor's authorized representative, and includes the Construction Manager at Risk, if applicable.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect or Program Manager in the ~~Architect's~~ administration of the Contract, activities of the Owner (or Owner's Program Manager, if applicable), or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

3.1.4 The Contractor represents and warrants the following to the Owner (in addition to the other representations and warranties contained in the Contract Documents), as an inducement to the Owner to execute this Contract, which

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representations and warranties shall survive the execution and delivery of the Contract and the Final Completion of the Work:

.1 that it is financially solvent, able to pay its debts as they mature, and possessed of sufficient working capital to complete the Work and perform its obligations under the Contract Documents;

.2 that it is able to furnish the tools, materials, supplies, equipment, and labor required to timely complete the Work and perform its obligation hereunder and has sufficient experience and competence to do so;

.3 that it is authorized to do business in the State where the Project is located and properly licensed by all necessary governmental, public, and quasi-public authorities having jurisdiction over it, the Work, or the site of the Project; and

.4 that the execution of the Contract and its performance thereof are within its duly-authorized powers.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 ~~Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.~~ The Contractor represents and warrants by submission of a Proposal that he has carefully examined the Contract Documents, any soil test reports, drainage studies, geotechnical or other reports, and the site of the Work, and that, from his own investigations, he has satisfied himself as to the nature and location of the Work, the character, quality and quantity of surface and subsurface materials likely to be encountered, the character of equipment and other facilities needed for the performance of the Work, the general and local conditions and all other materials which may in any way affect the Work or its performance. Should the Contractor find discrepancies, omissions or conflicts within the Contract Documents, or be in doubt as to their meaning, the Contractor shall at once notify in writing the Architect and Owner, and Architect will issue a written addendum to all parties that is consistent with the Owner's Scope of the Work The Contractor shall not be entitled to any additional time or compensation for any additional work caused by the Contractor's fault, improper construction, or by Contractor's failure to carefully study and compare the Contract Documents to actual observable site conditions prior to execution of the Work.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Drawings and other Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are ~~not~~ for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; ~~however,~~ the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. ~~It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.~~ Contractor shall not perform any Work involving an error, inconsistency, or omission without further instructions to Contractor or revised Construction Documents from the Architect.

§ 3.2.3 Neither the Owner nor ~~T~~the Contractor is ~~not~~ required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

3.2.3.1 Any design errors or omissions noted by the Contractor during this review shall be reported promptly to the Architect, but it is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents

§ 3.2.4 If the Contractor has knowledge that any of the products or systems specified will perform in a manner that will limit the Contractor's ability to satisfactorily perform the Work or to honor his warranty, or will result in a limitation of or interference with the Owner's intended use, then the Contractor shall promptly notify the Architect and Owner in writing, providing substantiation for his position. Any necessary changes, including substitution of

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materials, shall be accomplished by appropriate Modification. If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2, ~~or~~ 3.2.3, or 3.2.3.1, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2, ~~or~~ 3.2.3, or 3.2.3.1, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. Contractor shall take field measurements, verify field conditions, and shall carefully compare them to the Construction Documents. ~~If t~~The Contractor ~~performs those obligations, the Contractor~~ shall ~~not~~ be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities when the Contractor recognized or should have recognized such error, inconsistency, omissions or difference, and failed to report it to the Architect. Contractor shall not be entitled to additional compensation or additional Work caused by Contractor's failure to carefully study and compare the Construction Documents prior to the execution of the Work.

3.2.5 Prior to performing any Work, and only if applicable, Contractor shall locate all utility lines as shown and located on the plans and specifications, including the telephone company lines and cables, sewer lines, water pipes, gas lines, electrical lines, including, but not limited to, all buried pipelines and buried telephone cables, and shall perform any Work in such a manner so as to avoid damaging any such lines, cables, pipes, and pipelines. In addition, Contractor shall independently determine the location of same. Contractor shall be responsible for any damage done to such utility lines, cables, pipes, and pipelines during its Work, and shall be responsible for any loss, damage, or extra expense resulting from such damage. Repairs shall be made immediately to restore all service. Any delay for such break shall be attributable to Contractor. In addition, and only if applicable, Contractor shall review the appropriate AHERA and hazardous materials surveys for the particular campuses involved in the Project, and shall notify all Subcontractors and Sub-subcontractors of the necessity to review said surveys. Contractor shall perform any Work in such a manner as to avoid damaging, exposing, or dislodging any asbestos-containing materials that are clearly identified and located in AHERA and other hazardous material surveys. Before performing any portion of the Work, the Contractor shall fully investigate all physical aspects of the Project Site and verify all dimensions, measurements, property lines, grades and elevations, existing improvements, and general suitability of existing conditions at the Project site. If applicable, Contractor shall comply with U.S. Environmental Protection Agency rules concerning renovating, repairing, or painting work in schools built prior to 1978 involving lead-based paint.

3.2.6 The Owner shall be entitled to deduct from the Contract Sum, amounts paid to the Architect for the Architect to evaluate and respond to the Contractor's requests for information, where such information was available to the Contractor from a careful study and comparison of the Contract Documents, field conditions, Owner provided information, Contractor-prepared coordination drawings, or prior Project correspondence or documentation. If, in the reasonable opinion of the Architect, the Contractor does not make reasonable effort to comply with any of the above requirements of the Contract Documents, and this causes Architect or his Consultants to expend an unreasonable amount of time in the discharge of the duties imposed by the Contract Documents, then the Contractor shall bear the cost of compensation for the Architect's additional services made necessary by such failure.

3.2.7 The Contractor shall arrange meetings prior to commencement of the Work of all major Subcontractors to allow the Subcontractors to demonstrate an understanding of the Construction and Contract Documents to the Architect and to allow the Subcontractors to ask for interpretations, when necessary. The Contractor and each Subcontractor shall be evaluated and satisfy themselves as to the conditions and limitations under which the Work is to be performed, including:

.1 The location, condition, layout, drainage, and nature of the Project site and surrounding areas;
.2 Generally prevailing climatic conditions;
.3 Anticipated labor supply and costs;
.4 Availability and cost of materials, tools, and equipment; and
.5 Other similar issues.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract

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Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects, in writing, to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

Contractor shall attend weekly, or as otherwise directed by Owner, job site progress meetings. Program Manager shall conduct such meetings; and, shall manage Architect's recording, transcribing and distributing minutes to attendees, Architect, and other appropriate parties

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors. It is understood and agreed that the relationship of Contractor to Owner shall be that of an independent Contractor. Nothing contained herein or inferable here from shall be deemed or construed to (1) make Contractor the agent, servant or employee of the Owner, or (2) to create any partnership, joint venture, or other association between the Owner and Contractor. Any direction or instruction by Owner or any of its authorized representatives in respect to the Work shall relate to the results the Owner desires to obtain from the Work, and shall in no way affect Contractor's independent Contractor status described herein. As part of that responsibility, Contractor shall enforce the Owner's alcohol-free, drug-free, tobacco-free, harassment-free, and weapon-free policies and zones, which will require compliance with those policies and zones by Contractor's employees, subcontractors, and all other persons carrying out the Contract. Contractor shall require all construction workers, whether Contractor's own forces or the forces of Contractor's subcontractors, while on Owner's property to refrain from committing any criminal conduct, using tobacco products, possessing or drinking alcoholic beverages, possessing or using illegal drugs or controlled substances, carrying or possessing weapons, speaking profane and/or offensive language, or engaging in any inappropriate interactions of any nature whatsoever with students and employees, including talking, touching, staring or otherwise contributing to a hostile or offensive environment for Owner's students and employees. All areas of campus, other than the defined construction area, shall be off limits to Contractor's forces, unless their work assignment specifies otherwise. Contractor shall also require adequate and appropriate dress and identification of Contractor's employees, subcontractors, and all other persons carrying out the Work. Contractor shall require all construction workers, whether Contractor's own forces or the forces of Contractor's subcontractors, to wear identification tags on the front of their persons during all times that they are on Owner's property. Such identification tags shall contain a current photograph and the worker's full name in a typeface large enough to be seen from a reasonable distance. The Contractor shall further ensure that no on-site fraternization shall occur between personnel under the Contractor's and Subcontractor's direct or indirect supervision and Owner's students or employees and the general public. Failure of an individual to adhere to these standards of conduct shall result in the immediate removal of the offending employee from all construction on any of Owner's property. Repeated removal of Contractor's or Contractor's subcontractor's forces, or one serious infraction, shall constitute a substantial breach of the Contract justifying the immediate termination by Owner pursuant to Article 14. Contractor shall require all construction workers, whether Contractor's own forces or the forces of Contractor's subcontractor, to park their personal motor vehicles on Owner's property only in the parking places designated by the Owner's campus principal. Any vehicles not parked in the appropriate locations shall be towed at the vehicle owner's sole expense. Contractor shall follow, and shall require all employees, agents, or subcontractors to follow, the tree ordinance of the municipality in which the Project is located. In addition, if not covered by the municipal tree ordinance, Contractor shall barricade and protect all trees on the Project, which shall be included in the Cost of the Work. Contractor shall institute a theft deterrence program designed to restrict construction worker access to properties of Owner that are currently in use, to maintain supervision of Contractor's and Contractor's subcontractor's forces, and to reimburse the Owner or those persons suffering a theft loss which results from Contractor's forces or Contractor's subcontractor's forces' actions, omissions, or failure to secure the Work connecting or adjacent to property of Owner.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work. Contractor shall execute the Work in a good and workmanlike manner, continuously and diligently in accordance with generally accepted standards of construction practice for construction of projects similar to the Project, using qualified, careful and efficient workers and in conformity with the provisions of the Contract Documents.

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3.3.4 The Contractor shall properly and efficiently coordinate the timing, scheduling, and routing of all Work performed by all sub-contractors and sub-subcontractors.

3.3.5 To the extent that any portion of the Work requires a trench excavation exceeding five (5') feet in depth, in accordance with Texas Health and Safety Code § 756.023(a), Contractor shall fully comply, and shall require any applicable subcontractor to comply, with:

.1 The Occupational Safety and Health Administration standards for trench safety in effect for the Construction of the Work;
.2 The special shoring requirements, if any, of the Owner;
.3 Any geotechnical information obtained by Owner for use by the Contractor in the design of the trench safety system; and
.4 Trench excavation safety protection shall be a separate pay item, and shall be based on linear feet of trench excavated. Special shoring requirements shall also be a separate pay item, and shall be based on the square feet of shoring use.

3.3.6 The Contractor shall review Subcontractor safety programs, procedures, and precautions in connection with performance of the Work. However, the Contractor's duties shall not relieve any Subcontractor(s) or any other person or entity (e.g. a supplier), including any person or entity with whom the Contractor does not have a contractual relationship, of their responsibility or liability relative to compliance with all applicable federal, state, and local laws, rules, regulations, and ordinances which shall include the litigation to provide for the safety of their employees, persons, and property and their requirements to maintain a work environment free of recognized hazards. The foregoing notwithstanding, the requirements of this Paragraph are not intended to impose upon the Contractor any additional obligations that the Contractor would not have under any applicable state or federal laws, including, but not limited to, any rules, regulations, or statutes pertaining to the Occupations Safety and Health Administration.

3.3.7 It is understood and agreed that the relationship of Contractor to Owner shall be that of an independent contractor. Nothing contained in this Contract or inferable from this Contract shall be deemed or construed to: 1) make Contractor the agent, servant or employee of the Owner; or 2) create any partnership, joint venture, or other association between Owner and Contractor. Any direction or instruction by Owner or any of its authorized representatives in respect of the Work, shall relate to the result the Owner desires to obtain from the Work, and shall in no way affect Contractor's independent contractor status. Pursuant to Texas Labor Code § 214.008, the Contractor and any subcontractor on the Project, shall properly classify, as an employee or an independent contractor, in accordance with Texas Labor Code Chapter 201, any individual the Contractor or subcontractor directly retains and compensates for services performed in connection with this Contract. Any Contractor or subcontractor who fails to properly classify such an individual, may be subject to penalties of Texas Labor Code § 214.008(c).

§ 3.4 Labor and Materials

§ 3.4.1 These Contract Documents shall not be construed to deny or diminish the right of any person to work because of the person's membership or other relationship status with respect to any organization. Texas Government Code § 2269.054. These Contract Documents shall also not prohibit, require, discourage or encourage a person, or discriminate against a person bidding on this contract from entering into or declining to enter into, or adhering to, an agreement with a collective bargaining organization relating to this Project. Texas Government Code § 2269.0541. Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for qualified, careful, and efficient workers and labor, eligible to work in accordance with state and federal law. Contractor shall appropriately classify all workers in accordance with the Fair Labor Standards Act, its implementing regulations, and Texas Labor Code § 214.008. In addition, unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work. Before ordering any material or doing any Work, Contractor shall verify all dimensions and check all conditions in order to assure Contractor that they are the same as those in Drawings, Specifications, and other Construction Documents. Any inconsistency shall be brought to the attention of the Architect. In the event that discrepancies occur between ordered material and actual conditions and Architect was not notified beforehand, then costs to correct such discrepancies shall be borne by Contractor.

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§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the prior written consent of the Owner, after evaluation by the Architect and Program Manager ~~and~~ in accordance with a Change Order or Construction Change Directive.

3.4.2.1 After evaluation by the Architect, substitutions and alternates may be rejected by the Architect or Program Manager without explanation and will be considered only under one or more of the following conditions: (i) the proposal is required for compliance with interpretation of code requirements or insurance regulations then existing; (ii) specified products are unavailable through no fault of the Contractor; (iii) and when, in the judgment of the Architect, a substitution would be substantially in the Owner's best interests, in terms of cost, time, or other considerations.

3.4.2.2 The Contractor must submit to the Architect: (i) a full explanation of the proposed substitution and submittals of all supporting data, including technical information, catalog cuts, warranties, test results, installation instructions, operating procedures, and other like information necessary for a complete evaluation for the substitution: (ii) a written explanation of the reasons the substitution should be considered, including the benefits to the Owner and the Work in the event the substitution is acceptable; (iii) the adjustment, if any, in the Contract Sum; (iv) the adjustment, if any, in the time of completion of the Contract and the construction schedule; and (v) an affidavit stating (a) the proposed substitution conforms to and meets all requirements of the pertinent Specifications and the requirements shown on the Drawings, and (b) the Contractor accepts the warranty and will coordinate the Work to be complete in all respects, as if originally specified by the Architect. Proposals for substitution shall be submitted in writing to the Architect in sufficient time to allow the Architect no less than fifteen (15) working days for review. No substitutions will be considered or allowed without the Contractor's submittals of complete substantiating data and information.

3.4.2.3 Whether or not the Architect accepts any proposed substitution, the Contractor shall reimburse the Owner for any fees charged by the Architect or other consultants for evaluating each proposed substitution.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them. THE CONTRACTOR RELEASES, INDEMNIFIES AND HOLDS HARMLESS THE OWNER FOR CONTRACTOR'S FORCES' NON-COMPLIANCE WITH OWNER'S DRUG-FREE, ALCOHOL-FREE, WEAPON-FREE, HARASSMENT-FREE, AND TOBACCO-FREE ZONES, CONTRACTOR'S FORCES' NON-COMPLIANCE WITH CRIMINAL LAW, OR CONTRACTOR'S OR CONTRACTOR'S FORCES' NON-COMPLIANCE WITH IMMIGRATION LAW OR REGULATIONS. Any individual found by Owner to have violated these restrictions is subject to permanent removal from the Project, at the Owner's request. Contractor shall place similar language in its subcontract agreements, requiring the Subcontractors and Sub-subcontractors to be responsible for their own forces, and Contractor shall cooperate with the Owner to ensure Subcontractor and Sub-subcontractor compliance.

3.4.4 Including, but not limited to, the specific requirement of Article 10, Contractor, its subcontractors and vendors shall bear responsibility for compliance with all federal, state, and local laws, regulations, guidelines, and ordinances pertaining to work safety and applicable to the Work. Contractor further recognizes that the Owner and Architect do not owe the Contractor any duty to supervise or direct his work so as to protect the Contractor from the consequences of his own conduct.

3.4.5 Pursuant to Texas Education Code § 44.034, Contractor must give advance written notice to the Owner if the Contractor or an owner or operator of the Contractor has been convicted of a felony. The notice must include a general description of the conduct resulting in the conviction of a felony. The Owner may terminate this Contract if the Owner determines that the Contractor failed to give such notice or misrepresented the conduct resulting in the conviction. This paragraph requiring advance notice does not apply to a publicly-held corporation.

3.4.6 CRIMINAL HISTORY CHECKS

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3.4.6.1 So that Owner can obtain the national criminal history record information required by Texas Education Code Section 22.08341 on all "covered employees" (as defined in Section 3.4.6.3) of Contractor, its subcontractors, or any subcontracting entities who will perform the Work, Contractor shall submit to Owner the name and all necessary identifying information necessary to enable Owner to obtain the national criminal history information on those covered employees before they begin the Work. Contractor's submission will include the employee's written authorization for Owner to obtain such criminal history information. Owner may, in its sole discretion, prohibit the use of any employee to perform the Work after its review of the criminal history information, but cannot disclose the criminal history information to Contractor. Contractor shall reimburse Owner for Owner's costs incurred in obtaining the criminal history information. Contractor's violation of this section shall constitute a substantial failure under Article 14.

3.4.6.2 Contractor will not assign any "covered employee" with a "disqualifying criminal history," as those terms are defined below, to work on the Project. If Contractor receives information that a covered employee has a reported disqualifying criminal history, then Contractor will immediately remove the covered employee from the Project and notify the Owner in writing within three (3) business days. If the Owner objects to the assignment of any covered employee on the basis of the covered employee's criminal history record information, then Contractor agrees to discontinue using that covered employee to provide services on Owner's Project. If Contractor has taken precautions or imposed conditions to ensure that the employees of Contractor and any subcontractor will not become covered employees, Contractor will ensure that these precautions or conditions continue throughout the time the contracted services are provided.

3.4.6.3 For the purposes of this Section, "covered employees" means employees, agents, or applicants of Contractor who has or will have continuing duties related to the services to be performed on Owner's Project and has or will have direct contact with Owner's students. The Owner will decide what constitutes direct contact with Owner's students. "Disqualifying criminal history" means: any conviction or other criminal history information designated by the Owner; any felony or misdemeanor conviction that would disqualify a person from obtaining educator certification under Texas Education Code § 21.060, and 19 Texas Administrative Code § 249.16; or one of the following offenses, if at the time of the offense, the victim was under 18 years of age or enrolled in a public school; a felony offense under Texas Penal Code Title 5 Offense Against Persons; an offense for which a defendant is required to register as a sex offender under Texas Code of Criminal Procedure Chapter 62; or an equivalent offense under federal law or the laws of another state.

3.4.7 OWNER'S ADDITIONAL REQUIREMENTS RELATED TO CRIMINAL HISTORIES

In addition, as provided in Section 3.4.6.1 above, Owner or Contractor will at least annually obtain criminal history record information that relates to any employee, agent, or applicant of the Contractor, if the person has or will have duties related to the Project, and the duties are or will be performed on Owner's Project, or at another location where students are likely to be present. Contractor shall assume all expenses associated with the background checks and shall immediately remove any employee, agent, or subcontractor who was convicted of a felony or a misdemeanor involving moral turpitude from Owner's property, or other location where students are likely to be present. Owner shall determine what constitutes "moral turpitude" or a "location where students are likely to be present."

3.4.7.1 If the Contractor is the person or owner or operator of the business entity, that individual may not self-certify regarding the criminal history record information and its review, and must submit original evidence acceptable to the Owner with this ~~Agreement~~Contract showing compliance

3.4.8 PREVAILING WAGE RATES

3.4.8.1 Contractor, Contractor's Subcontractors and Sub-subcontractors shall pay all workers not less than the general prevailing rate of per diem wages for work of a similar character where the project is located as detailed in the "Minimum Wage Schedule" attached to this Contract. Wages listed are minimum rates only. However, no claims for additional compensation above the Contract Sum shall be considered by the Owner because of payments of wage rates in excess of the applicable rate provided herein. Texas Government Code § 2258.001 *et seq*.

3.4.8.2 Contractor shall forfeit, as a penalty to the Owner, $60 for each laborer, worker, or mechanic, employed for each calendar day or part of the day that the worker is paid less than the wage rates stipulated in the Contract Documents.

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3.4.8.3 Owner reserves the right to receive and review payroll records, payment records, and earning statements of employees of Contractor, and of Contractor's Subcontractors and Sub-subcontractors.

3.4.8.4 In executing the Work under the Contract Documents, Contractor shall comply with all applicable state and federal laws, including but not limited to, laws concerned with labor, equal employment opportunity, safety and minimum wages.

3.4.8.5 If no schedule is attached to the Contract, Contractor shall use the wage rates contained in the Project Manual for the Project. If no wage rates are in the Project Manual, then the parties shall use the wage rate determined by the U.S. Department of Labor in accordance with the Davis-Bacon Act, 40 U.S.C. § 276a, (which can be accessed on the internet at https://www.wdol.gov/or https://beta.sam.gov/) effective as of the date of this Contract.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require, ~~or permit~~ and that the Work will conform to the requirements of the Contract Documents.~~permit~~. The Contractor further warrants that Contractor shall perform the Work in a good and workmanlike manner, continuously and diligently in accordance with generally accepted standards of construction practice for construction of projects similar to the Project, except to the extent the Contract Documents expressly specify a higher degree of finish or workmanship, in which case the standard shall be the higher standard. All material shall be installed in a true and straight alignment, level and plumb; patterns shall be uniform; and jointing of materials shall be flush and level, unless otherwise directed in writing by the Architect. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance (unless such maintenance is Contractor's responsibility), improper operation, or normal wear and tear and normal usage, but such exclusions shall only apply after Owner has taken occupancy of the damaged or defective portion of the Project. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment. Notwithstanding anything in the Contract Documents to the contrary, Owner and Contractor expressly agree that the warranties stated herein shall mean the individual warranties associated with each particular Work within the Project, and each such individual warranty shall run from the applicable Work's Final Completion date (unless otherwise expressly provided in the applicable Contract Documents for that particular Work.) Contractor's express warranty is in addition to, and not in lieu of, Owner's other available remedies. All required warranties on equipment, machinery, materials, or components shall be submitted to the Architect on the manufacturer's or supplier's approved forms for delivery to the Owner. The warranties set out in this Subparagraph are not exclusive of any other warranties or guarantees set out in other places in the Contract Documents or expressed or implied under applicable law.

§ 3.5.2 ~~All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4~~Contractor shall certify that the ~~Project~~Work has been constructed in general conformance with the Architect's or Engineer's plans, specifications, and Construction Documents, as modified from time to time pursuant to the terms of the Contract Documents. Contractor shall fully complete a "Certification of Project Completion" as required by 19 Texas Administrative Code § 61.1040~~36~~.

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3.5.3 In the event of failure of materials, products, or workmanship, either during construction or the warranty period, the Contractor shall take appropriate measures to ensure correction of defective Work or replacement of the defective items, without cost to the Owner. Such warranty shall be maintained notwithstanding that certain systems may be activated prior to Substantial Completion as required for the satisfactory completion of the Project. Upon written notice from the Owner or Architect, the Contractor shall promptly remedy defects as covered by Contractor's warranty. If Contractor does not respond to the written notice, either by beginning corrective work or notifying Owner in writing regarding when corrective work will begin, within ten (10) days of Contractor's receipt of the written notice, then the Owner may take measures to correct the Work and Contractor will be obligated to reimburse Owner's costs. The provisions of this subparagraph shall be in addition to, and not in lieu of, any other rights and remedies available to the Owner.

3.5.3.1 All required warranties on equipment, machinery, materials, or components shall be submitted to the Architect on the manufacturer's or supplier's approved forms at the time of Substantial Completion

3.5.4 When deemed necessary by the Owner and prior to installation of any item specifically made subject to a performance standard or regulatory agency standard under any provision of the Contract Documents, Contractor shall furnish proof of conformance to the Architect. Proof of conformance shall be in the form of:

.1 an affidavit from the manufacturer certifying that the item is in conformance with the applicable standards; or

.2 an affidavit from a testing laboratory certifying that the product has been tested within the past year and is in conformance with the applicable standards; or

.3 such further reasonable proof as is required by the Architect.

3.5.5 The Contractor agrees to issue the warranty (or warranties) in the name of the Owner, or assign the warranty (or warranties) to the Owner at Final Completion of the Work, such assignment to be effective no later than Final Completion, for any and all material, equipment, fixtures, and furniture (if supplied or installed by Contractor or its subcontractor), or other special warranties, and manufacturers' warranties relating to materials and labor used in the Work. Contractor further agrees to perform the Work in such manner so as to preserve any and all manufacturer's warranties. All forms will be required to be submitted prior to Final Payment.

3.5.6 The warranties of Contractor provided in Section 3.5 shall in no way limit or abridge the warranties of the suppliers of equipment and systems which are to comprise a portion of the Work and all such warranties shall be in form and substance as required by the Contract Documents. Contractor shall take no action or fail to act in any way which results in the termination or expiration of such third party warranties or which otherwise results in prejudice to the rights of Owner under such warranties. Contractor agrees to provide all notices required for the effectiveness of such warranties and shall include provisions in the contracts with the providers and manufacturers of such systems and equipment whereby Owner shall have a direct right, but not a duty, of enforcement of such warranty obligations.

3.5.7 Contractor shall maintain a complete and accurate schedule of the date(s) of Substantial Completion, the date(s) of Final Completion, and the dates upon which the warranty under Section 12.2 herein on each phase or building will expire. Contractor shall provide a copy of such schedules to Owner and Architect. Prior to termination of the warranty period under Section 12.2 herein, Contractor shall accompany Owner and Architect on re-inspection of each Work in the Project and Contractor shall be responsible from correcting any warranty items which are observed or reported during the warranty period under Section 12.2 herein. Contractor shall prosecute such warranty work under Section 12.2 herein without interruption until accepted by Owner and Architect, even though such work shall extend beyond the warranty period under Section 12.2 herein. If Contractor fails to provide the schedules to Owner and Architect, Contractor's warranty obligation described herein shall continue until such inspection is conducted and deficiencies are corrected.

3.5.8 Prior to receipt of Final Payment, Contractor shall:

.1 Obtain duplicate original warranties, executed by all subcontractors, making the dates of beginning of the warranties the Date of Final Completion; and the warranties of suppliers and manufacturers, making the dates of beginning of the warranties no later than the Date of Final Completion;

.2 Verify that the documents are in proper form and contain full information;

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.3 Co-sign warranties when required;

.4 Bind all warranties in commercial quality 8-1/2 X 11 inch three-ring binder, with hardback, cleanable, plastic covers;

.5 Label the cover of each binder with a typed or printed title labeled "WARRANTIES", along with the title of the Project, name, address, and telephone number of Contactor, and name of its responsible principal;

.6 Include a Table of Contents, with each item identified by the number and title of the specification section under which the product is specified;

.7 Separate each warranty with index tab sheets keyed to the Table of Contents listing; and

.8 Deliver warranties and bonds in the form described above, to the Architect who will review same prior to submission to the Owner.

3.5.8.1 Contractor and Owner acknowledge that the Project may involve construction work on more than one school building for the Owner. Each building, or approved phase of each building, shall have its own, separate, and independent date of substantial completion, dates upon which the one-year warranty on each phase or building, which is substantially complete, will expire, and dates of final completion. Contractor agrees to provide notice of the warranty expiration date to Owner and Architect at least one month prior to the expiration of the one (1) year warranty period on each building or each phase of the building that has been substantially completed. If Owner, Architect or Program Manager discovers during the warranty period, deficiencies not previously reported, Contractor shall accompany the Owner, Architect and Program Manager on an inspection of such deficiencies and Contractor shall be responsible for correcting any such deficiencies not caused by the Owner or the use of the building. For extended warranties required by various sections, i.e., roofing, compressors, mechanical equipment, Owner will notify the Contractor of deficiencies and Contractor shall start remedying these defects within fifteen (15 days of initial notification from Owner. Contractor shall prosecute the work without interruption until accepted by the Owner and the Architect, even though such prosecution should extend beyond the limit of the warranty period. If Contractor fails to provide notice of the expiration of the one (1) year warranty period at least one month prior to the expiration date, Contractor's warranty obligation described in this paragraph shall continue until such inspection is conducted and any deficiencies found in the inspection corrected Contractor shall certify that the Work has been constructed in accordance with the Contract Documents. Any work performed by the Contractor that is not in accordance with the Contract Documents is defective and a breach of this agreement unless the Owner has agreed in writing to waive the defect. The Contractor shall provide all reasonable assistance in achieving compliance with building code specifications, accessibility standards, and Texas Education Agency Commissioner's rules in the Work.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect. Owner is an exempt entity under the tax laws of the State of Texas. Texas Tax Code § 151.309; 34 TAC § 3.322. The Owner represents that this Project is eligible for exemption from the State Sales Tax on tangible personal property and material incorporated in the Project, provided that the Contractor fulfills the requirements of the Texas Tax Code § 151.309; § 151.310; § 151.311, and 34 TAC § 3.291 and § 3.287. For the purpose of establishing exemptions, it is understood and agreed that the Contractor may be required to segregate materials and labor costs at the time a Contract is awarded. Contractor will accept a Certificate of Exemption from the Owner, pursuant to Texas Tax Code § 151.054(e), § 151.155, and 34 TAC § 3.287. Contractor shall obtain Certificates of Resale from Contractor's suppliers. Texas Tax Code § 151.154; 34 TAC § 3.285. Failure of Contractor or any Sub-Contractor to obtain Certificates of Resale from their suppliers shall make the Contractor or Sub-Contractor responsible for absorbing the tax without compensation from Owner. Contractor shall pay all necessary local, county, and state taxes, income tax, compensation tax, social security, and withholding payments, as required by law. CONTRACTOR HEREBY RELEASES, INDEMNIFIES, AND HOLDS HARMLESS OWNER FROM ANY AND ALL CLAIMS AND DEMANDS MADE AS A RESULT OF THE FAILURE OF CONTRACTOR OR ANY SUBCONTRACTOR TO COMPLY WITH THE PROVISIONS OF ANY OR ALL SUCH LAWS AND REGULATIONS.

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3.6.2 ~~1~~ The Dallas Independent School District is an exempt organization as defined by the Limited Sales and Excise Use Tax Act of Texas. The Contractor may issue an exemption certificate in lieu of sales tax on the purchase, rental or lease of all materials, supplies, equipment used or consumed and other tangible personal property incorporated into the property being improved by virtue of this Contract, as well as all materials, supplies, equipment and other tangible personal property used or consumed by the Contractor in performing this Contract with the Dallas Independent School District. The Contractor may issue exemption certificate(s) to its suppliers in lieu of said sales tax for all of said materials and supplies. The uses of said materials and supplies for which an exemption from the said sales tax is claimed and any such exemption certificate(s), shall comply with the applicable rulings of the State Comptroller.

3.6.3 ~~2~~ The Contractor shall be held to have studied all tax laws for the State of Texas, the County of Dallas, Texas and the City of Dallas, Texas, and shall pay all taxes for which he may be liable as a consumer or user of goods, or otherwise without addition to the contract price. The Contractor shall pay all sales, consumer, use and other similar taxes required by law.

3.6.4 ~~3~~ Title to all goods or materials purchased under a~~s~~ resale certificate shall vest in the District at the time of initial possession by the Program Manager and shall be used only in performance of Services under this ~~Agreement~~Contract. Program Manager shall cause such items to promptly be marked, labeled or otherwise physically identified as the District's property. Program Manager shall cause items purchased under a resale certificate to send the receiving ticket to the District to be added to inventory before use by the Program Manager. Any tangible personal property purchased under a resale certificate as described above not fully used up in the Services shall remain with the District

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 ~~Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded~~After Architect has filed the plans and specifications with the Texas Department of Licensing and Regulation, Architect shall notify Contractor that Contractor may make and submit the applications for the building permit. The ~~Owner~~Contractor shall pay the municipality directly for the building permit and all other development "impact" fees, if any. The Contractor shall continue to be responsible for payment of other permits, governmental fees, licenses and inspections necessary for proper execution of the Contract and which are legally required when bids or proposals are received. Such fees and expenses shall only be reimbursable to Contractor if expressly agreed to herein.

Architect shall assist Contractor in obtaining an Occupancy Permit by accompanying governing officials during inspections, including the architectural barrier inspection and correction, of the Project, if requested to do so by the Program Manager or the Owner. Architect shall assist the Contractor in obtaining the Certificate of Occupancy prior to the issuance of the Certificate of Substantial Completion.

3.7.1.1 The Owner shall pay directly to the governing authority the cost of all permanent property utility assessments and similar connection charges.

3.7.1.2 The Contractor shall pay directly all temporary utility charges, tap charges, and water meter charges, without reimbursement from Owner. After consultation with the Owner, the Contractor shall also obtain all permits and approvals, and pay all fees and expenses, if any, associated with National Pollutant Discharge Elimination System (NPDES) regulations administered by the Environmental Protection Agency (EPA) and local authorities, if applicable, that require completion of documentation and/or acquisition of a "Land Disturbing Activities Permit" for the Project. Also after consultation with the Owner, the Contractor shall obtain all permits and approvals, and pay all fees and expenses, if any, associated with Storm Water Pollution Prevention and Pollution Control Plan (SWPPP) regulations administered by the Texas Commission on Environmental Quality (TCEQ) and local authorities. Contractor's obligations under this Section may or may not require it to obtain or perform engineering services during the pre-construction phase to prepare proper drainage for the construction sites. Any drainage alterations made by Contractor during the construction process, which require the issuance of a permit, shall be at Contractor's sole cost. Reimbursable expenses shall not include any fines or penalties assessed against the Contractor, Contractor's subcontractors, the Project, or the Owner.

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§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work. In addition, Contractor shall authorize posting of any notices required of Owner pursuant to Texas Business and Commerce Code, Section 116.0001, or any notices concerning the Workers Compensation insurance carried by other parties involved in the Project, including without limitation, Architect, at the same location where Contractor posts notices regarding Workers Compensation. If applicable, the Contractor shall procure and obtain all bonds required of the Owner or the Contractor by the municipality in which the Project is located or by any other public or private body with jurisdiction over the Project. In connection with such bonds, the Contractor shall prepare all applications, supply all necessary back-up material, and furnish the surety with any required personal undertakings. The Contractor shall also obtain and pay all charges for all approvals for street closings, traffic control, parking meter removal, and other similar matters as may be necessary or appropriate from time to time for the performance of the Work.

§ 3.7.3 If the Contractor performs Work when Contractor knows~~ing~~ or reasonably should have known it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, the Contract Documents, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 [*Intentionally deleted*] ~~Concealed or Unknown Conditions~~

~~If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than three 14(3) business days after first observance of the conditions. Contractor agrees that this is a reasonable notice requirement. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially, report findings and a recommended resolution in writing to Owner and Contractor. If Owner's Board of Trustees and Contractor cannot agree on an equitable adjustment to the Contract Sum or Contract Time, then either party may pursue alternative dispute resolution as provided for in Article 15, within ninety (90) days of the Architect's recommendation. If such conditions will cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, the Architect will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.~~

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect in writing. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

3.7.6 The Contractor shall be responsible for timely notification to and coordination with all utility companies regarding the provision of services to the Project. The Contractor shall inform the Architect and Program ~~at~~Manager at once when the Owner's participation is required, and the Architect shall immediately notify the Owner. Connections for temporary and permanent utilities and payment for temporary utilities services required for the Work, whether the Work is new construction or renovation of an existing facility, are the responsibility of the Contractor unless otherwise agreed. If the Work is new construction, the payment for temporary and/or permanent utility services shall be the responsibility of the Contractor until Substantial Completion.

3.7.6.1 The Owner shall pay directly to the relevant jurisdiction those fees presently called "Storm Water Disposal Fees" to the water and sewage departments. Contractor shall ascertain amounts and advise Architect. Water meter charges shall be paid by the Contractor

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§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, unless required to do so by the terms of the Construction Documents.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- **.1** allowances shall cover the cost to the Contractor of materials and equipment delivered at the site ~~and all required taxes~~, less applicable trade discounts;
- **.2** Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, bonds, insurance, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- **.3** whenever costs are more than or less than allowances, the Contract Sum or the Owner's Contingency, at Owner's discretion, unless required to do so by the terms of the Construction Documents, shall be adjusted accordingly ~~by Change Order~~. The amount of the adjustment~~Change Order~~ shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner ~~with reasonable promptness~~ , to avoid delay in the Work, provided that if a decision is needed to avoid delay, Contractor shall notify Architect and Program Manager in writing sufficiently in advance of needed date to allow reasonable time for selections to be made

3.8.4 When performing Work under allowances, Contractor shall solicit and receive not less than three (3) written proposals and shall provide the Work as directed by the Architect, upon Owner's written approval, on the basis of the best value to the District.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. In addition, the Contractor may employ a project manager and necessary assistants who may supervise several Project sites. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor. Important communication shall be similarly confirmed in writing. Other communications shall be similarly confirmed on written request in each case. Questions about plan interpretation or directions shall be submitted to the Architect in the form of a written request for information and the Architect shall respond to such request for information in a reasonable and timely fashion. Contractor's selection of project manager or superintendent(s) shall be approved by Owner, and Contractor shall not replace the project manager or superintendent(s) without Owner's consent or until a replacement project manager or superintendent(s) has been selected in accordance with this Section. The Owner may reject or require removal of any job superintendent, project manager, or employee of the Contractor, Subcontractor, or Sub-Subcontractor involved in the Project. Contractor shall provide an adequate staff for the proper coordination and expedition of the Work. Owner reserves the right to require Contractor to dismiss from the Work any employee or employees that Owner may deem incompetent, careless, insubordinate, or in violation of any provision in these Contract Documents. This provision is applicable to Subcontractor, Sub-Subcontractor, and their employees.

§ 3.9.2 ~~The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.~~

§ 3.9.3 ~~The~~ Contractor's superintendent shall be present full-time on the site as soon as possible after commencement of the Work, and shall remain~~ed~~ assigned to this Work and present on the site during performance of the Work, throughout the course of the Work, until items requiring completion or correction, identified at Substantial Completion pursuant to Section 9.8, have been completed or corrected. From Substantial Completion until Final Completion, the superintendent shall be on the site as necessary to ensure that Final Completion occurs within 30 days of Substantial Completion~~not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed~~.

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3.9.4 Owner shall be notified not less than 24 hours before any time that superintendent will not be present at the site for any reason except periodic illness. If the reason is due to illness, then Owner shall be notified at the beginning of that day. Owner shall be notified of the identity of the acting superintendent. In the event the superintendent is absent from the site and notice has not been provided nor has an acting superintendent been assigned to the Work, then an amount equal to the superintendent's daily rate shall be deducted for the amount owed to the Contractor under general conditions for such day.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare for and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project. The schedule shall not interfere with the operation of Owner's existing facilities and operations without Owner's prior written approval.

3.10.1.2 In the event that the Contractor is entitled to an extension of the Substantial Completion Date or any required interim completion date under the Contract Documents, Owner shall be entitled to direct the acceleration or re-sequencing of the Work in order to achieve the prior scheduled Substantial Completion Date or interim completion dates, and Contractor shall be reimbursed for the amount of the premium portion of overtime actually incurred in respect thereto and shall be entitled to an increase adjustment to the Contract Sum to the extent of the premium portion of overtime so incurred. Before proceeding with any such Owner-directed acceleration plan under this subparagraph, the Contractor shall have received the Owner's prior written approval of the plan and its anticipated not-to-exceed cost.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall prepare and submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect and Program Manager reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in ~~general~~ accordance with the most recent schedules submitted to the Owner and Architect.

3.10.4 The Contractor shall hold weekly progress meetings at the Project Site, or at such other time and frequency as are acceptable to the Owner. Program Manager shall conduct such meetings; and, shall manage Architect's recording, transcribing and distributing minutes to attendees, Architect, and other appropriate parties. Progress of the Work shall be reported at said meeting with reference to Contractor's construction schedule. The Contractor shall submit to the Architect, with each monthly application for payment, a copy of the progress schedule showing all modifications required, and shall take whatever corrective action is necessary to assure that the project completion schedule is met at no additional cost to Owner, except as allowed herein. In the event that Contractor shall fall behind schedule at any time, Contractor shall develop and deliver a recovery plan to the Owner with a recovery schedule and a program describing the additional manpower, overtime, material expediting, resequencing of the Work, and other steps Contractor shall take to meet the requirements of the Contract. Contractor shall not be entitled to compensation from the Owner or any increase in the Contract Sum for the schedule recovery efforts. No approval or consent by the Owner of any plan for resequencing or acceleration of the Work submitted by Contractor shall constitute a waiver by Owner of any damages or losses which Owner may suffer by reason of such resequencing or the failure of Contractor to meet the Substantial Completion Date or the Final Completion Date.

3.10.5 The process of approving Contractor's schedules and updates to Contractor's schedule shall not constitute a warranty by the Owner that any non-Contractor milestones or activities will occur as set out on Contractor's schedule. Approval of a Contractor's schedule does not constitute a commitment by the Owner to furnish any Owner-furnished information or material any earlier than Owner would otherwise be obligated to furnish that information or material under the Contract Documents. Failure of the Work to proceed in the sequence scheduled by

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Contractor shall not alone serve as the basis for a Claim for additional compensation or time. In the event there is interference with the Work, which is beyond its control, Contractor shall attempt to reschedule the Work in a manner that will hold resulting additional time and costs to a minimum. The construction schedule shall be in a detailed format satisfactory to the Owner, the Architect and Program Manager. If not accepted, the construction schedule shall be promptly revised by the Contractor in accordance with the recommendations of the Owner, Program Manager and Architect and re-submitted for acceptance. The Contractor shall monitor the progress of the Work for conformance with the requirements of the construction schedule and shall promptly advise the Owner of any delays or potential delays. The accepted construction schedule shall be updated to reflect actual conditions (sometimes referred to in these Supplementary Conditions as progress reports) as set forth in Subparagraph 3.10.1 or if requested by either the Owner or the Architect.

3.10.6 The Owner shall have the right to reschedule the time of day for the performance of any part of the Work that may interfere with the operation of the Owner's premises or any tenants or invitees thereof. The Contractor shall, upon the Owner's request, reschedule any portion of the Work affecting operation of the premises during hours when the premises are not in operation. Any rescheduling of performance of the Work under this Subparagraph 3.10.6 may be grounds for an extension of the Contract Time, if permitted under Subparagraph 8.3.1, and an equitable adjustment in the Contract Sum, if: 1) the performance of the Work was properly scheduled by the Contractor in compliance with the requirements of the Contract Documents, 2) such rescheduling is required for the convenience of the Owner and is not attributable to any act or omission of Contractor.

3.10.7 The Owner's need for delivery of completed work, or portions thereof, is largely controlled by the necessities of the school calendar and operations of school programs within that calendar. These needs are reflected in any scheduled completion dates and milestone dates set out in the Contract Documents. The Contractor shall perform the work in such a way as to not interfere with school operations, the importance of meeting milestones and completion dates, and Contractor acknowledges and agrees that if these dates are not met, there may be a relaxation in the needed delivery dates because of the school calendar. When it appears to Owner or Contractor that a Contract milestone or completion date cannot be met for reasons not the fault of the Contractor, Contractor will develop with the Owner, Program Manager and Architect a plan and a budget under the Change Order provision of the Contract Documents to meet such a situation either (at Owner's option) by accelerating the Work to overcome the delays, or suspending or otherwise slowing the Work to efficiently take advantage of any relaxation in Owner's need for the completed Work.

§ 3.11 Documents and Samples at the Site

The Contractor shall maintain and make available, at all times, at the Project site, the Construction~~act~~ Documents, including Change Orders, Construction Change Directives, field test records (including environmental inspection and test records), inspection certificates or records, manufacturers' certificates, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner at all times, and delivered to the Architect for completion of record drawings.

3.11.2 In addition to any other requirement in the Contract Documents and prior to installation, Contractor shall furnish or cause a subcontractor to furnish for the Owner's and Architect's written approval, a physical sample of each specified item, product, fixture, or device which is visible by the general public and/or attached to an architecturally-finished surface. Samples shall be suitably labeled, adequately protected, and properly stored at the site. Samples which are approved and undamaged will be considered to be suitable for incorporation into the Work.

§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

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§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. The purpose of their submittal is to demonstrate for those portions of the Work for which submittals are required by the Contract Documents and ~~Their purpose is to demonstrate~~ how the Contractor proposes to conform to the ~~information given and the design concept expressed in the~~ Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents~~, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule~~, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

§ 3.12.6 By approving and submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents ~~to the Owner and Architect~~ that the Contractor has ~~(1) reviewed and approved them, (2)~~ determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and ~~(3)~~ checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents. Specific dimensions, quantities, installation and performance of equipment and systems in compliance with the Construction Documents and the Contract Documents remain the Contractor's responsibility.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. ~~The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents.~~ The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, completeness, and accuracy of the services, certifications, and approvals performed or provided by such design professionals~~, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy~~. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. A registered architect must prepare

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plans and specifications for all the Work, as governed by the Texas Occupations Code Chapter 1051; and a registered engineer must prepare plans, specifications, and estimates for all Work governed by Texas Occupations Code Chapter 1001. In the event that Contractor retains a licensed design professional under the terms of this paragraph, Contractor shall require that the licensed design professional carry commercial general liability and errors and omissions insurance coverage in the same amounts and forms as required by the Architect on this Project. In the event that the licensed design professional retained by the Contractor will be conducting on-site services or observations, the licensed design professional shall also carry worker's compensation insurance and comprehensive automobile liability in the same amounts and form as required of the Architect to this Project.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

3.12.11 The Contractor shall submit complete drawings, data, and samples to the Architect at least fifteen (15) days prior to the date the Contractor needs the reviewed submittals and samples returned. The Contractor shall be prepared to submit color samples on any key items (such as quarry tile, vinyl wall covering, etc.) within fifteen (15) days of the award of Subcontract(s). All color samples required for the Work shall be received within sixty (60) days of the date of the approval of the Contract Sum, if the Project is an A101 project; or Guaranteed Maximum Price, if the Project is an A133 project. Once samples of all key items are received, the Architect will finalize color selections.

3.12.12 The Contractor shall submit the number of copies of product data and samples which the Contractor and subcontractors need for their use, plus two (2) additional sets for the Architect, one (1) additional set for the Owner, and one (1) additional set for each of the Architect's consultants involved with the particular section of Work. Where shop drawings are involved, the Contractor shall submit one (1) high quality reproducible transparency, and one (1) opaque print of the shop drawing for the Architect, plus one (1) additional opaque print for each of the Architect's consultants involved with the particular section of Work. The reproducible transparency will be marked by the Architect and/or his consultants. After final review and correction of the submittal, the Contractor shall send one corrected set to the Architect and each of the Architect's consultants involved with the particular section of the Work.

3.12.13 The Architect's review of Contractor's submittals shall be limited to examination of an initial submittal and one (1) re-submittal. The Architect's review of additional submittals will be made only with the consent of the Owner after notification by the Architect. The Owner shall be entitled to reimbursement from the Contractor of amounts paid to the Architect for evaluation of such additional re-submittals.

3.1.2.14 The Contractor represents and warrants that all shop drawings shall be prepared by persons and entities possessing expertise and experience in the trade for which the shop drawings are prepared and, if required by the Architect or applicable law, by a licensed engineer.

§ 3.13 Use of Site

3.13.1 The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment. When the Work is to be performed at an existing school location, Contractor shall schedule and perform the Work in a manner that does not compromise the safety to school students, faculty and staff, and does not unreasonably disrupt or interfere with the continuing normal routine of the school. If a School Operations Parameters Statement is a part of the Contract Documents, Contractor will comply with its terms, at no increase in price.

3.13.2 Only materials and equipment which are to be used directly in the Work shall be brought to and stored on the Project site by the Contractor. After equipment is no longer required for the Work, it shall be properly removed from the Project site. Protection of construction material and equipment stored at the Project site from weather, theft, damage, and all other adversity is solely the responsibility of the Contractor.

3.13.3 The Contractor and its subcontractor shall not erect any sign on the Project site without the prior written consent of the Owner.

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3.13.4 Contractor shall ensure that the Work, at all times, is performed in a manner that affords Owner reasonable access, both vehicular and pedestrian, to the site of the Work and all adjacent areas. The Work shall be performed in such a manner that the public area adjacent to the Site of the Work shall be free from all debris, building material, and equipment likely to cause hazardous conditions. Without limitation of any other provision of the Construction Documents, Contractor shall use its best efforts to minimize any interference with the occupancy or beneficial use of any area or building adjacent to the site of the Work, or the building, in the event of partial occupancy.

3.13.5 Without prior approval of the Owner, the Contractor shall not permit any workers to use any existing facilities at the Project site, including, without limitation, lavatories, toilets, entrance and parking areas other than those designated by the Owner. The Contractor shall comply with all rules and regulations promulgated by the Owner in connection with the use and occupancy of the Project site and the Building.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly provided, however, that any such cutting, fitting, or patching can only be performed if the cutting, fitting, or patching results in Work that is in accordance with the Construction Documents and Contract Documents. ~~All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.~~

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

3.14.3 No cutting of structural elements will be permitted unless specifically approved in writing by Architect. Fitting and patching shall only be done with new products, and shall only be performed by those skilled in performing the original Work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall, on a daily basis, keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. Contractor shall provide on-site containers for the collection of waste materials, debris and rubbish, and shall periodically remove waste materials, debris and rubbish from the Work and dispose of all such materials at legal disposal areas away from the site. All cleaning operations shall be scheduled so as to ensure that contaminants resulting from the cleaning process will not fall on newly-coated or newly-painted surfaces. Immediately after unpacking materials, all packing case lumber or other packing materials, wrapping or other like flammable waste shall be collected and removed from the building and premises. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project. Care shall be taken by all workers not to mark, soil, or otherwise deface any finish. In the event that any finish becomes defaced in any way by mechanics or workers, the Contractor or any of his Subcontractors shall clean and restore such surfaces to their original condition.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the ~~Owner shall be entitled to reimbursement from~~from the cost thereof shall be charged to the Contractor.

3.15.3 The Contractor shall be responsible for the protection of the Work. Prior to the Architect's inspection for Substantial Completion, the Contractor shall clean exterior and interior surfaces exposed to view; remove temporary labels, stains, putty, soil, paint and foreign substances from all surfaces, including glass and painted surfaces; polish transparent and glossy surfaces; clean equipment and fixtures to a sanitary condition; replace air filters in mechanical equipment; clean roofs, gutters, and downspouts; remove obstructions and flush debris from drainage systems; clean site; sweep paved areas, and rake clean other surfaces; remove trash and surplus materials from the site; clean and polish all floors; clean and polish all hardware; and repair all Work damaged during cleaning.

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3.15.4 After construction is complete, Contractor shall: (1) employ skilled workers for final cleaning; (2) remove grease, mastic adhesive, dust, dirt, stains, fingerprints, labels and other foreign materials from all sight-exposed interior and exterior surfaces; (3) wash and shine glazing and mirrors; (4) polish glossy surfaces to a clear shine; (5) vacuum clean carpet and similar soft surfaces; (6) clean (damp mop with clean mop and water) resilient and hard surface floors, repeating as necessary until no visible residue remains on floors; (7) clean plumbing fixtures to a sanitary condition; (8) clean surfaces of all equipment and remove excess lubrication; (9) clean permanent filters and replace disposable filters in ventilating system if units are operated during construction and clean ducts, blowers, and coils; (10) clean light fixtures; (11) remove waste, foreign matter, and debris from roofs, gutters, area ways, and drainage ways; (12) remove waste, debris, and surplus materials from the site; (13) remove stains, spills, and foreign substances from paved areas; and (14) broom clean exterior concrete and paved surfaces, and rake clean the grounds.

§ 3.16 Access to Work

The Contractor shall provide the Owner, Program Manager and Architect and their designated representatives with access to the Work in preparation and progress wherever located. The presence of the Owner, Program Manager or Architect at the Work site does not imply acceptance or approval of the Work. ~~The presence of the Owner, Architect, or their representatives does not constitute acceptance or approval of the Work.~~

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. THE CONTRACTOR SHALL DEFEND SUITS OR CLAIMS FOR INFRINGEMENT OF COPYRIGHTS AND PATENT RIGHTS AND SHALL WAIVE AND RELEASE CLAIMS AGAINST THE OWNER, PROGRAM MANAGER AND ARCHITECT, AND SHALL INDEMNIFY AND HOLD HARMLESS THE OWNER AND ARCHITECT ~~HARMLESS~~ FROM LOSS ON ACCOUNT THEREOF, PROVIDED, HOWEVER, CONTRACTOR ~~BUT~~ SHALL NOT BE RESPONSIBLE TO ARCHITECT FOR SUCH DEFENSE OR LOSS WHEN A PARTICULAR DESIGN, PROCESS, OR PRODUCT OF A PARTICULAR MANUFACTURER OR MANUFACTURERS IS REQUIRED BY THE CONTRACT DOCUMENTS, OR WHERE THE COPYRIGHT VIOLATIONS ARE CONTAINED IN DRAWINGS, SPECIFICATIONS, OR OTHER DOCUMENTS PREPARED BY THE ~~OWNER OR~~ ARCHITECT, AND SHALL NOT BE RESPONSIBLE TO OWNER IF OWNER REQUIRES A PARTICULAR DESIGN, PROCESS, OR PRODUCT THAT CONSTITUTES A COPYRIGHT VIOLATION. However, if the Contractor has reason to believe that the required design, process, or product is an infringement of a copyright or patent ~~is discovered by, or made known to, the Contractor,~~ the Contractor shall be responsible for ~~the~~such loss unless such~~the~~ information is promptly furnished to the Owner and Architect in writing.

§ 3.18 Indemnification

§ 3.18.1 TO THE FULLEST EXTENT PERMITTED BY LAW, THE CONTRACTOR SHALL WAIVE AND RELEASE CLAIMS AGAINST AND SHALL INDEMNIFY AND HOLD HARMLESS THE OWNER, ARCHITECT, ARCHITECT'S CONSULTANTS, OWNER'S TRUSTEES, CONSULTANTS, -PROGRAM MANAGER, AND OFFICERS, AGENTS AND EMPLOYEES OF ANY OF THEM FROM AND AGAINST CLAIMS, DAMAGES, LOSSES, CAUSES OF ACTION, SUITS, JUDGMENTS AND EXPENSES, INCLUDING BUT NOT LIMITED TO ATTORNEYS' FEES, ARISING OUT OF OR RESULTING FROM PERFORMANCE OF THE WORK, PROVIDED THAT SUCH CLAIM, DAMAGE, LOSS, OR EXPENSE IS ATTRIBUTABLE TO BODILY INJURY, SICKNESS, DISEASE OR DEATH, OR TO INJURY TO OR DESTRUCTION OF TANGIBLE PROPERTY (INCLUDING THE WORK ITSELF), INCLUDING LOSS OF USE RESULTING THEREFROM, BUT ONLY TO THE EXTENT CAUSED IN WHOLE OR IN PART BY THE WILLFUL OR NEGLIGENT ACTS OR OMISSIONS OF THE CONTRACTOR, A SUBCONTRACTOR, ANYONE DIRECTLY OR INDIRECTLY EMPLOYED BY THEM, ANYONE THEY CONTROL OR EXERCISE CONTROL OVER OR ANYONE FOR WHOSE ACTS THEY MAY BE LIABLE, REGARDLESS OF WHETHER OR NOT SUCH CLAIM, DAMAGE, LOSS, OR EXPENSE IS CAUSED IN PART BY A PARTY BY ANY WILLFUL OR NEGLIGENT ACTS OR OMISSIONS OF OWNER OR OWNER'S CONSULTANTS OR OTHER INDEMNIFIED PARTIES. SUCH OBLIGATION SHALL NOT BE CONSTRUED TO NEGATE, ABRIDGE, OR REDUCE OTHER RIGHTS OR OBLIGATIONS OF INDEMNITY THAT WOULD OTHERWISE EXIST AS TO A PARTY OR PERSON DESCRIBED IN THIS SECTION 3.18. ALL COSTS AND EXPENSES SO INCURRED BY ANY OF THE INDEMNIFIED PARTIES IN THAT EVENT SHALL BE REIMBURSED BY CONTRACTOR TO THE INDEMNIFIED PARTIES, AND ANY COST AND EXPENSES SO INCURRED BY INDEMNIFIED PARTIES SHALL BEAR INTEREST UNTIL REIMBURSED BY CONTRACTOR, AT THE RATE OF INTEREST PROVIDED TO BE PAID BY THE JUDGMENT UNDER THE LAWS OF THE STATE OF TEXAS.

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3.18.2 IN CLAIMS AGAINST ANY PERSON OR ENTITY INDEMNIFIED UNDER THIS SECTION 3.18 BY AN EMPLOYEE OF THE CONTRACTOR, A SUBCONTRACTOR, ANYONE DIRECTLY OR INDIRECTLY EMPLOYED BY THEM, OR ANYONE FOR WHOSE ACTS THEY MAY BE LIABLE, THE INDEMNIFICATION OBLIGATION UNDER SECTION 3.18.1 SHALL NOT BE LIMITED BY A LIMITATION ON AMOUNT OR TYPE OF DAMAGES, COMPENSATION, OR BENEFITS PAYABLE BY OR FOR THE CONTRACTOR OR A SUBCONTRACTOR UNDER INSURANCE POLICIES, WORKERS' COMPENSATION ACTS, DISABILITY BENEFIT ACTS, OR OTHER EMPLOYEE BENEFIT ACTS.

3.18.3 THE OBLIGATIONS OF THE CONTRACTOR UNDER THIS SECTION 3.18 SHALL NOT EXTEND TO THE LIABILITY OF THE ARCHITECT. THE ARCHITECT'S CONSULTANTS, AND AGENTS, AND EMPLOYEES OF ANY OF THEM, CAUSED BY OR RESULTING FROM: (1) DEFECTS IN PLANS, DESIGNS, OR SPECIFICATIONS PREPARED, APPROVED, OR USED BY THE ARCHITECT OR ENGINEER; OR (2) NEGLIGENCE OF THE ARCHITECT OR ENGINEER IN THE RENDITION OR CONDUCT OF PROFESSIONAL DUTIES CALLED FOR OR ARISING OUT OF THE CONSTRUCTION CONTRACT AND THE PLANS, DESIGNS, OR SPECIFICATIONS THAT ARE A PART OF THE CONSTRUCTION CONTRACT; AND (3) ARISING FROM: (A) PERSONAL INJURY OR DEATH; (B) PROPERTY DAMAGE; OR (C) ANY OTHER EXPENSES THAT ARISE FROM PERSONAL INJURY, DEATH, OR PROPERTY DAMAGE OR AS OTHERWISE LIMITED BY TEXAS CIVIL PRACTICE & REMEDIES CODE SECTION 130.001 ET SEQ.

3.18.4 THE OWNER MAY CAUSE ANY OTHER CONTRACTOR WHO MAY HAVE A CONTRACT WITH THE OWNER TO PERFORM CONSTRUCTION OR INSTALLATION WORK IN THE AREAS WHERE WORK WILL BE PERFORMED UNDER THIS AGREEMENT, TO AGREE TO INDEMNIFY AND TO HOLD THE OWNER AND THE CONTRACTOR HARMLESS FROM ALL CLAIMS FOR BODILY INJURY AND PROPERTY DAMAGE TO THE SAME EXTENT AS IS PROVIDED IN SECTION 3.18.1 ABOVE. LIKEWISE, CONTRACTOR AGREES TO INDEMNIFY AND TO HOLD THE OWNER'S OTHER CONTRACTORS HARMLESS FROM ALL CLAIMS FOR BODILY INJURY AND PROPERTY DAMAGE TO THE SAME EXTENT AS PROVIDED IN SECTION 3.18.1 ABOVE.

3.18.5 THE PROVISIONS OF SECTION 3.18 IN ITS ENTIRETY SHALL SURVIVE THE COMPLETION, TERMINATION, OR EXPIRATION OF THIS CONTRACT.

3.18.6 It is agreed with respect to any legal limitations now or hereafter in effect and affecting the validity or enforceability of the indemnification obligations under Paragraph 3.18, such legal limitations are made a part of the indemnification obligation and shall operate to amend the indemnification obligation to the minimum extent necessary to bring the provision into conformity with the requirements of such limitations, and as so modified, the indemnification obligations shall continue in full force and effect.

3.18.7 It is understood and agreed that Subparagraph 3.18.1 above is subject to, and expressly limited by, the terms and conditions of Texas Civ. Prac. & Rem. Code Ann. Sec. 130.001 to 130.005, as amended.

3.18.8 THE OWNER MAY CAUSE ANY OTHER CONTRACTOR WHO MAY HAVE A CONTRACT WITH THE OWNER TO PERFORM CONSTRUCTION OR INSTALLATION WORK IN THE AREAS WHERE WORK WILL BE PERFORMED UNDER THIS AGREEMENT, TO AGREE TO INDEMNIFY AND TO HOLD THE OWNER AND THE CONTRACTOR HARMLESS FROM ALL CLAIMS ATTRIBUTABLE TO BODILY INJURY, SICKNESS, DISEASE, OR DEATH OR TO INJURY TO, OR DESTRUCTION OF TANGIBLE PROPERTY (INCLUDING THE WORK ITSELF) INCLUDING LOSS OF USE, TO THE SAME EXTENT AS PROVIDED IN SUBPARAGRAPH 3.18.1 ABOVE.

3.19 ANTITRUST VIOLATION. To permit the Owner to recover damages suffered in antitrust violations, Contractor hereby assigns to Owner any and all claims for overcharges associated with this Contract which violate the antitrust laws of the United States, 15 U.S.C.A. Section 1 *et seq*. The Contractor shall include this provision in its agreements with each subcontractor and supplier. Each subcontractor shall include such provisions in agreements with sub-subcontractors and suppliers.

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ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the ~~Agreement~~Contract.

§ 4.1.2 Owner shall notify Contractor when the duties, responsibilities or limitation of authority of the Architect have been modified

4.1.3 Except as expressly provided herein, the Contractor shall not be relieved of Contractor's obligation to perform the Work in strict accordance with the Construction Documents and the Contract Documents by the duties, responsibilities, or activities of the Architect.

§ 4.2 Administration of the Contract

§ 4.2.1 Certain portions of the administration of the Contract will be performed by the Architect, others by the Program Manager. Both the Architect and the Program Manager will be treated as the Owner's representatives to the extent set out in the Contract Documents. Neither the Architect nor the Program Manager shall have the authority to act on behalf of ~~the Owner only to the extent provided in the Contract Documents.~~ Owner unless such authority is expressly granted in the Contract Documents, nor shall such authority be implied from any act or representation of the Architect or Program Manager. ~~The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction, until the date the Architect issues the final~~ This period shall extend until payment is due, and, with the Owner's concurrence, from time to time during the one-year period for correction of Work described in Section 12.2.2~~Certificate for Payment~~. ~~The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents, or as they may be amended in the future.~~

§ 4.2.2 The Architect, as a representative of the Owner, ~~will~~shall visit the site at least twice per week (or more per week when deemed necessary by the Owner's Superintendent or when necessary to protect Owner's interests) and at any other intervals appropriate to the stage of construction, to inspect ~~or as otherwise agreed with the Owner, to become generally familiar with~~ the progress, ~~and~~ quantity and quality of the ~~portion of the~~ Work completed, to reject any observed nonconforming Work, and to determine ~~in general~~ if the Work ~~observed~~ is being performed in a manner indicating that the Work, when ~~fully~~ completed, will be in accordance with the Construction Documents and the Contract Documents and on time. Furthermore, a minimum of two job site meetings per month from commencement of construction through Final Completion will be initiated by the Architect and attended by the Contractor. Attendees will include Owner, the Contractor's project manager and/or superintendent, Architect's project representative, and Architect. The Architect, Owner and their representatives shall at all times have access to the Work. Architect, or its structural consultant will provide on-site observation prior to and during all concrete pours that contribute to the structural integrity of the building, including all pours of concrete piers, footings, grade beams, floor slabs, and concrete superstructure components, if applicable. In addition, Architect or its structural consultant will provide on-site observation prior to covering up or closing up of portions of the construction, which if covered, would conceal problems with the structural integrity of the Project. Contractor shall not close or cover said Work until said observations have occurred. Contractor or Architect will advise Owner of the need for any third party laboratory or testing services to assist the Architect and Owner. On the basis of the on-site observations by Architect, Architect shall keep Owner and Contractor informed of the progress and the quality of the Work, through Architect's field reports, and shall guard Owner against defects and deficiencies in the Work. Architect shall promptly notify Owner and Contractor, orally, regarding any defect or nonconforming Work, which shall be followed by notice in writing of defects or nonconforming Work noted and corrective action taken or recommended. ~~However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work.~~ The Architect, however, ~~will~~shall not have control over~~, charge of~~, or responsibility for the Contractor's construction means, methods, techniques, sequences, ~~or~~ procedures, or ~~for the~~ safety ~~precautions and~~ programs, but this does not relieve Architect of Architect's responsibilities under this Contract. Any services by Contractor made necessary by Contractor's construction defect or nonconforming Work, shall be performed at no additional cost to Owner ~~in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents~~.

§ 4.2.3 ~~On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work.~~ The Architect will not be responsible for the Contractor's

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failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work. The Contractor shall reimburse the Owner for compensation paid to the Architect for additional site visits made necessary by the fault, neglect, or request of the Contractor.

§ 4.2.4 Communications

~~Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, T~~the Owner and Contractor shall ~~endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. However, Owner reserves the right to communicate directly with Contractor and Subcontractors include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project.~~ Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. ~~The Contract Documents may specify other communication protocols.~~

§ 4.2.5 As further provided in the Contract Documents, ~~B~~based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect ~~has authority to~~ shall reject Work that does not conform to the Construction Documents and the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will ~~have~~recommend to Owner additional ~~authority to require~~ inspection or testing of the Work in accordance with ~~Sections 13.4.2 and 13.4.3~~the provision of the Contract Documents, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect or the Owner to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work. Architect and/or Contractor shall promptly notify, orally and in writing, the other party and Owner of any fault or defect in the Project or nonconformance with Construction Documents or the Contract Documents they may respectively discover, and each, upon discovery of the defect or nonconformance, shall be responsible for notifying the other party and Owner of those corrective actions they respectively take; provided, however, Contractor shall have no duty to notify Owner of discoveries made or actions taken by Architect. Testing or inspection required by this subparagraph shall be conducted subject to the requirements of Chapter 2269 of the Texas Government Code.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Construction Documents and the Contract Documents. The Architect's action will be taken ~~in accordance~~ with ~~the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with~~ reasonable promptness as to cause no delay in the Work or in the activities of the Owner, Contractor, or Separate Contractors, while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation ~~or performance~~ of equipment or systems, ~~all of which~~ remain the responsibility of the Contractor as required by the Construction Documents and the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component. If any submittal does not comply with the requirements of the Construction Documents or the Contract Documents, then Architect shall require Contractor to come into compliance. The Architect shall promptly report, in writing, to the Contractor, Program Manager and Owner any errors, inconsistencies, and omissions discovered by the Architect in the Shop Drawings, Product Data, and Samples.

§ 4.2.8 The Architect ~~will~~shall review, prepare, and make recommendations to Owner regarding all Change Orders and Construction Change Directives for the Owner's approval and execution in accordance with the Construction Documents and the Contract Documents, accompanied by all supporting documentation. The Architect~~, and~~ may ~~order~~authorize minor changes in the Work not involving any adjustment in Contract Sum or Guaranteed Maximum

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Price, or an extension of the Contract Time which are consistent with the intent of the Contract Documents. If necessary, the Architect shall prepare, reproduce, and distribute Drawings and Specifications to describe Work to be added, deleted, or modified, as provided in Section 7.4. The Architect shall accept requests by the Owner, and Owner shall review properly prepared, timely requests by the Contractor for change in the Work, including adjustments to the Contract Sum or Guaranteed Maximum Price, or Contract Time. A properly prepared request for a change in the Work by the Contractor shall be accompanied by sufficient supporting data and information to permit the Architect ~~will investigate and~~to make a reasonable determination~~s~~ without extensive investigation or preparation of additional drawings or specifications. If the Architect determines that requested changes in the Work are not materially different from the requirements of the Construction Documents or the Contract Documents, and do not change the Contract Sum or Guaranteed Maximum Price, or Contact Time, then the Architect may issue an order for a minor change in the Work, with prior written notice to the Owner or recommend to the Owner that the requested change be denied. The Architect is not authorized to approve changes involving major system such as: Heating, Ventilation and Air Conditioning ("HVAC"); roof, foundation; outward appearance, color scheme, floor plans, building materials; drainage or mechanical equipment with Owner's prior written consent ~~and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4~~.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; ~~issue Certificates of Substantial Completion pursuant to Section 9.8;~~ will receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor ~~pursuant to Section 9.10~~; and will issue a final Certificate for Payment ~~pursuant to Section 9.10~~upon compliance with the requirements of the Contract Documents.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the ~~Project representatives~~ Architect have been ~~,~~modified.

§ 4.2.11 The Architect will interpret and ~~decide matters~~make recommendations concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If no agreement is made concerning the time within which interpretations required of the Architect shall be furnished in compliance with this Paragraph 4.2, then delay shall not be recognized on account of failure by the Architect to furnish such interpretations until 15 days after written request is made for them.

§ 4.2.12 Interpretations ~~and decisions~~or recommendations of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and ~~decisions~~recommendations, the Architect will endeavor to secure faithful performance by both Owner and Contractor~~, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith~~.

§ 4.2.13 The ~~Architect's~~ Owner's decisions on matters relating to aesthetic effect ~~wi~~shall be final ~~if consistent with the intent expressed in the Contract Documents~~.

§ 4.2.14 The Architect will review and respond to requests for information about the Construction Documents and the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information, at no additional cost to the Owner.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract

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Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner, ~~and~~ Architect and Program Manager, in writing, of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect ~~ma~~or ~~ys~~Program Manager shall notify, in writing, the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Owner or Architect to provide notice ~~within the 14-day period~~promptly shall constitute notice of no reasonable objection. All subcontractors shall be procured in accordance with Texas Education Code Chapter 44, Subchapter B, and Texas Government Code Chapter 2269, as applicable. A notice of no reasonable objection shall in no way relieve the Contractor from full responsibility for performance and completion of the Work and its obligations under the Contract Documents. The Contractor shall be fully responsible for the performance of its subcontractors, including those recommended or approved by the Owner.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner, Program Manager or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner, Program Manager ~~-~~or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. When~~If~~ the parties agree on a proposed substitute ~~but rejected~~ Subcontractor ~~was reasonably capable of performing the Work~~, then the Contract Sum and Contract Time ~~sh~~may~~ll~~ be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not change a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitute.

5.2.5 Each Contractor or Subcontractor shall be required to completely familiarize itself with the plans and specifications, to visit the Work site to completely familiarize itself with existing conditions, and to conduct any other appropriate investigations, inspections, or inquiries prior to submission of a bid or proposal. No increases in Contract Sums or Guaranteed Maximum Price shall be allowed for failure to so inspect or investigate.

The Contractor shall disclose to the Owner any ownership interest or affiliation between the Contractor and any potential subcontractor prior to entering into a subcontract and the Owner shall have the right, in its sole discretion and pursuant to 5.2.3., to reject any such affiliated subcontractor. Further, Contractor shall not subcontract the work as a whole.

The approval of Subcontractors in no way relieves the Contractor from full responsibility for performance and completion of the Work and its obligations under the Contract Documents. The Contractor shall be fully responsible for the performance of its Subcontractors, including those recommended or approved by the Owner

5.2.6 The Contractor agrees to utilize Subcontractors that are historically underutilized businesses in accordance with the Minority and Women Owned Business Enterprise (M/WBE) forms and guidelines attached hereto as Exhibit "C".

No changes to the Plan may be made unless approved in writing by the Owner. The Contractor, prior to the execution of this Contract, shall report their M/WBE participation goal as a percent of the Contract Sum. During the performance of all Work under this ~~Agreement~~Contract, the Contractor and its agents shall comply with all M/WBE policies of the Owner. The information shall be identified per firm, discipline and participation. While this ~~Agreement~~Contract is in effect and until the expiration of one year after final completion, the Owner may require information from the Contractor, and may conduct audits, to assure that the Plan is being, and was, followed,. With each Contractor's application for payment, the Contractor shall report their updated M/WBE Plan and actual M/WBE participation information.

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5.2.7 Contractor shall promptly notify the Owner, Architect and Program Manager of any material defaults by any subcontractor

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. The terms and conditions of the Contract Documents shall be incorporated by reference into each subcontract agreement, included as provided below. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights. ~~,~~ Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors. Each subcontractor shall provide proof of insurance to Contractor consistent with the Contractor's insurance to Owner and in an amount commensurate with the Work to be performed by the Subcontractor.

5.3.2 Neither the Owner nor the Architect shall be obligated to pay or to ensure the payment of any monies to subcontractors due to any non-payment to the Contractor or non-payment of subcontractors by the Contractor.

5.3.3 The Contractor shall require any potential subcontractor to disclose to the Contractor any ownership interest or familial relationship between the Contractor, the Architect, or the Owner, and the potential subcontractor prior to entering into a subcontract. Contractor shall report to Owner all such disclosures and the Owner shall have the right, in its sole discretion, to reject any such affiliated subcontractor.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for any unperformed portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to ~~Section~~Article 14~~.2~~ or abandonment of the Project by the Contractor; and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and

.2 assignment is subject to the prior rights and obligations of the surety, if any, obligated under bond relating to the Contract; and

.3 The Subcontractor provides bonds as required by law of prime contractors and by Owner.

~~When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.~~

§ 5.4.2 ~~Upon~~ ~~s~~Such assignment shall not constitute a waiver by Owner of its rights against Contractor, including, but not limited to, claims for defaults, delays or defects for which a subcontractor or material vendor may also be liable~~, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension~~.

§ 5.4.3 ~~Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the~~ Owner shall only be ~~assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally~~ responsible for compensating subcontractors for Work performed or materials furnished from and after the date on which the Owner gives written notice of its acceptance of the subcontract agreement. Owner shall not be responsible for any Work performed or materials furnished by subcontractors prior to the date of Owner's written notice of acceptance.~~all of the successor contractor's obligations under the subcontract~~.

5.4.4 Each subcontract shall specifically provide that the Owner shall only be responsible to the Subcontractor after written notice for undisputed amounts not previously paid to Contractor subsequent to the Owner's exercise of any rights under this conditional assignment.

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5.4.5 Contractor shall be fully responsible for the performance of its Subcontractors, including those selected or approved by the Owner

5.5 NOTICE OF SUBCONTRACTOR DEFAULT

Contractor shall promptly notify Owner and Architect of any material defaults by any Subcontractor or Sub-subcontractor. Notwithstanding any provision contained in Article 5 to the contrary, it is hereby acknowledged and agreed that Owner has in no way agreed, expressly or implicitly, nor will Owner agree, to allow any Subcontractor, Sub-subcontractor or other materialman or worker employed by Contractor the right to obtain a personal judgment or to create a mechanic's or materialman's lien against Owner for the amount due from the Owner or the Contractor.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation. The Owner reserves the right to perform other non-Project-related construction work, maintenance and repair work, and school program operations at the site and near the site during the time period of the Work. Owner shall have access to the building on the site at all times.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor ~~Agreement~~Contract.

§ 6.1.3 The ~~Owner~~ Contractor shall ~~provide for~~ coordinat~~e~~ion ~~of~~ the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor to ensure that the Work remains on schedule~~, who shall cooperate with them~~. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement between the Owner and Contractor. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.1.4 It shall be the responsibility of the Contractor to assist, review, coordinate, and schedule work performed by any of Owner's separate contractors including the hazardous materials abatement contractor. Contractor shall not be required to contract directly with the hazardous materials abatement contractor or Owner's separate contractor's however, Contractor shall coordinate all aspects of the hazardous materials abatement contractor's and Owner's separate contractor's work, including required monitoring, testing and inspections by independent firms, with the Work under this ~~Agreement~~Contract. The Contractor shall be totally responsible for coordination between its Subcontractors and the hazardous materials abatement contractor and any other Owner's separate contractors. Contractor will cooperate with the Owner to allow site access and staging areas for hazardous materials abatement contractor and Owner's separate contractors and consultants. Contractor shall review Owner's contract with the hazardous materials abatement contractor and Owner's separate contractors and become familiar with the requirements and scope of services contained therein. Contractor shall continually review the work performed by the hazardous materials abatement contractor and Owner's separate contractors and immediately notify the Owner and Program Manager if at any time during the performance of Contractor's work, the hazardous materials abatement contractor or any of Owner's separate contractors fail, in any way, to provide sufficient, competent manpower or timely perform its services. In addition, the Contractor shall be responsible for coordinating and providing all construction administration necessary for the Work and the work of the hazardous materials abatement contractor and any of Owner's separate contractors ~~Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.~~

§ 6.2 ~~Mutual~~Contractor's Responsibility

§ 6.2.1 It shall be the responsibility of the Contractor to assist, review, and coordinate the scheduling of work performed by any of the Owner's Separate Contractors including the hazardous materials abatement contractor.

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Contractor shall not be required to contract directly with the hazardous materials abatement contractor or Owner's separate contractor's however, Contractor shall coordinate all aspects of the hazardous materials abatement contractor's and Owner's separate contractor's work, including required monitoring, testing and inspections by independent firms, with the Work under this ~~Agreement~~Contract. The Contractor shall be totally responsible for coordination between its Subcontractors and the hazardous materials abatement contractor and any other Owner's separate contractors. Contractor will cooperate with the Owner to allow site access and staging areas for hazardous materials abatement contractor and Owner's separate contractors and consultants. Contractor shall review Owner's contract with the hazardous materials abatement contractor and Owner's separate contractors and become familiar with the requirements and scope of services contained therein. Contractor shall continually review the work performed by the hazardous materials abatement contractor and Owner's separate contractors and immediately notify the Owner and Program Manager if at any time during the performance of Contractor's work, the hazardous materials abatement contractor or any of Owner's separate contractors fail, in any way, to provide sufficient, competent manpower or timely perform its services In addition, the Contractor shall be responsible for coordinating and providing all construction administration necessary for the Work and the work of any of Owner's Separate Contractors. The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents. Contractor shall be responsible for coordination between Contractor's subcontractors and Owner's Separate Contractors. Contractor shall review Owner's contract with Owner's Separate Contractors and become familiar with the requirements and scope of services contained therein.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify, in writing, the Architect and Owner of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work, and shall promptly report, in writing, to the Architect and Owner if Owner's Separate Contractors fail in any way to timely perform their services or negatively impact Contractor's schedule or ability to perform the Work. Failure of the Contractor to notify, in writing, the Architect and Owner of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper, and is performed in a timely manner, to receive the Contractor's Work. The Contractor shall not be responsible for latent discrepancies or defects in the construction or operations by the Owner or Separate Contractor ~~that are not apparent~~.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. ~~The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.~~

6.2.3.1 If the Architect or Program Manager is required to provide additional services, as provided in the Contract between the Owner or Program Manager ~~-~~and the Architect, specifically relating to additional compensation for the Architect for evaluating an excessive number of claims submitted by the Contractor or others in connection with the Work in accordance with Owner's Contract with the Architect, then such services shall be paid for by the Contractor through the Owner, unless the additional services result from negligence of or an omission by the Architect and Program Manager.~~-~~

6.2.3.2 If the Architect provides services in connection with a legal proceeding, except when the Architect is a party thereto, and the Owner requests the Architect, in writing, to provide such services, then the cost of such services shall be paid for by the party whose act or omission was a proximate cause of the problem that led to the requirement to provide such services. Such services shall be paid for by such party through Owner, who upon receipt of same shall reimburse the Architect.

6.2.3.3 All construction costs resulting from the Contractor's negligence, lack of oversight, inattention to details, failure to investigate, or failure to follow the Construction Documents or Contract Documents, will be borne by the Contractor.

§ 6.2.4 The Contractor shall promptly remedy damage wrongfully caused by~~that~~ the Contractor ~~wrongfully causes~~ to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

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§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Owner~~Architect~~ will allocate the cost among those responsible.

6.3.1 Job site cleanup will be performed on a daily basis. The Owner and/or Program Manager will periodically check the site to see that all construction areas, nearby roads, walkways and/or grounds are maintained in a clean and safe manner. The cost to clean up the site will be assessed to the Contractor each time the Owner is required to clean the area due to failure of the Contractor or his designee to satisfactorily perform or enforce this site clean-up requirements. The Owner will assess the cost. Before assessing the cost, the Contractor shall be given notice of the failure to clean the site and one business day after the date of the notice to clean up the site. If the Contractor fails to clean up the site, after notice, the Owner may assess the cost for cleanup.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive, Contingency Authorization or order for a minor change in the Work~~.~~. A properly prepared written request for a change in the Work by Contractor shall be accompanied by sufficient supporting data and information to permit the Architect to make a recommendation to Owner. The Contract Sum and/or Contract Time may be increased for changes in the Work if the provisions of Article 7 have been met.

Architect shall review properly prepared, timely requests by Contractor for a proposed change in the Work, including but not limited to adjustments to the Contract Sum or Contract Time. A properly prepared request for a proposed change shall be accompanied by sufficient supporting data and information to permit Architect to make a reasonable determination without extensive investigation or preparation of additional drawings or specifications

§ 7.1.1.1 No changes in the Contract Sum and/or Contract Time will be allowed for a change in the Work unless prior to performing the changed Work the Contractor has provided the Owner in writing with a proposal for any change in price and/or change in Contract Time caused by the change in Work, and a Change Order is subsequently executed. A field directive or field order shall not be recognized as having any impact upon the Contract Sum or the Contract Time, and Contractor shall have no Claim therefore, unless it shall, prior to complying with the directive and in any event within ten (10) days of receiving the directive, submit a change proposal to the Owner, and a Change Order is subsequently executed, or Contractor satisfies the requirements of Paragraph 15

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone. A change in the work that does not require a change in Contract Sum or Contract Time may be paid from the Contingency Allowance. A Contingency Allowance Expenditure Authorization (CAEA) is a written order prepared by the Architect and signed by the Owner, Contractor and Program Manager directing a change in the Work. A CAEA shall not be used for minor changes in the Work. Note: If the Construction Manager Percentage Fee was not previously included in the approved GMP, the approved additions or deductions for authorized amounts for Contingency Expenditures will also include an appropriate adjustment for the Construction Manager Fee at the percentage approved in Article 5.1.1 and 5.1.2 of the modified AIA Document A133.

7.1.2.1 Contractor shall make no change in the materials used or in the specified manner of constructing and/or installing the Work or supply additional labor, services, or materials beyond that actually required by the terms of the Contract Documents, unless made pursuant to a written order from Owner authorizing Contractor to proceed with the change. No claim for an adjustment of the contract price will be valid unless so ordered.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Construction Documents or the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work. Except as permitted in

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Paragraph 7.3 or 15, a change in the Contract Sum or the Contract Time shall be accomplished only by Change Order. -Contractor shall not make any claim for an adjustment to time, Contract Sum, or Guaranteed Maximum Price due to: a change in the materials used; a change in the specified manner of constructing and/or installing the Work; or additional labor, services, or materials beyond that actually required by the terms of the Construction Documents or the Contract Documents, unless made pursuant to a written order or directive from Owner authorizing Contractor to proceed with a change in the Work. No claim for an adjustment to time, Contract Sum, or Guaranteed Maximum Price shall be valid unless so ordered or directed.

7.1.4 The total Contractor mark-up for overhead, profit, or fee for work performed by the Contractor's own forces shall not exceed 10% of the cost of the change in the Work. The total Contractor mark-up for overhead, profit, or fee for supervision of work performed by subcontractors' forces shall not exceed 4% of the cost of the change in the Work. The total subcontractor mark-up for overhead, profit, or fee for work performed by the subcontractor's forces shall not exceed 10% of the cost of the change in the Work. In no event shall total mark-up for overhead, profit, or fee in any work which involves a subcontractor or one or more sub-subcontractors, regardless of who performs the Work, exceed 14% of the total cost of the change in the Work.

7.1.5 The Contractor, upon receipt of written notification by the Architect of a proposed item of change in the Work, shall prepare as soon as possible a Change Proposal in such form or forms as directed by the Architect.

.1 Each separate Change Proposal shall be numbered consecutively and shall include materials, costs, labor costs, fees, overhead and profit. The Proposal shall specify all cost related to the proposed Change in the Work, including any disruption or impact on performance;

.2 The Subcontractor's itemized accounting shall be included with the Change Proposal;

.3 If a Change Proposal is returned to the Contractor for additional information or if the scope of the proposed change in the Work is modified by additions, deletions or other revisions, the Contractor shall revise the Change Proposal accordingly and resubmit the revised Change Proposal to the Architect and Program Manager;

.4 A revised Change Proposal shall bear the original Change Proposal number suffixed by the letter "R" to designate a revision in the original Change Proposal. If additional revisions to a revised Change Proposal are necessary, each subsequent revision shall be identified by an appropriate numeral suffix immediately following the "R" suffix;

.5 Upon written approval of a Change Proposal by the Owner, the Architect and the Program Manager; the Architect will prepare a Change Order authorizing such change in the Work; and

.6 The Contractor shall request extensions of Contract Time due to changes in the Work only at the time of submitting its Change Proposal. Contractor's failure to do so shall represent a waiver of any right to request a time extension

7.1.5.1 The combined overhead and profit included in the total cost to the Owner of a change in the Work shall be based on the following schedule:

.1 For approved additions or deductions to the Cost of the Work (not including preconstruction or general condition costs), the Construction Manager's Fee will be increased or decreased at the same percentage approved in Section 5.1.1 and 5.1.2 in the approved A133 contract document.

.2 For approved additions or deductions to any of the Construction Manager's subcontracts for self-performed work paid in accordance with the Section 2.3.2.2 of the A133 contract document, the self-performed work fee will be the same as approved in Section 2.3.2.2 of the A133 contract document.

.3 For approved additions or deductions to approved Subcontracts, the maximum markup on changed Work performed by the Subcontractor's own forces will be ten (10%) percent of the approved allowable Change Order costs.

.4 For approved additions or deductions to approved Subcontracts, the maximum markup on changes for Work performed by the Subcontractor's Sub-subcontractors will be four (4%) percent of the amount due the Sub-subcontractor.

.5 Cost to which overhead and profit is to be applied shall be determined in accordance with Subparagraph 7.3.7

.6 In order to facilitate checking of quotations for extras or credits, all proposals except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs including labor, materials, and Subcontracts. Labor and materials shall be itemized in the manner prescribed above. Where major cost items are Subcontracts, they shall be itemized also.

7.1.6 ~~5~~ Allowance balances may be used to fund changes in the Work. The Contractor will not be allowed an

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overhead, profit, or fee mark-up when changes in the Work are funded by one of the Allowances. The combined overhead and profit included in the total cost to the Owner of a change in the Work shall be based on the following schedule:

.1 For the Contractor, for Work performed by the Contractor's own forces, ten (10%) percent of the cost.

.2 For the Contractor, for Work performed by the Contractor's Subcontractor's, four (4%) percent of the amount due the subcontractors.

.3 For each Subcontractor involved, for Work performed by that Subcontractor's own forces, ten (10%) percent of the cost.

.4 For each Subcontractor involved, for Work performed by the Subcontractor's Sub-subcontractors, four (4%) percent of the amount due the Sub-subcontractor.

.5 Cost to which overhead and profit is to be applied shall be determined in accordance with Subparagraph 7.3.76.

.6 In order to facilitate checking of quotations for extras or credits, all proposals except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs including labor, materials and Subcontracts. Labor and materials shall be itemized in the manner prescribed above. Where major cost items are Subcontracts, they shall be itemized also

7.1.7 ~~6~~ If the Contract Sum is $1,000,000.00 or more, or if the Contract Sum is less than $1,000,000.00, and any Change Order, Construction Change Directives, or other Changes in the Work would increase the Contract Sum to $1,000,000.00 or more, the total of all Change Orders, Construction Change Directives, or other Changes in the Work, may not increase the Contract Sum by more than 25% of the original Contract Sum. Any Change Order, Construction Change Directive, or other Change in the Work that would exceed that limit is void and of no effect. Texas Education Code § 44.0411.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

.1 The change in the Work;

.2 The amount of the adjustment, if any, in the Contract Sum or Guaranteed Maximum Price; and

.3 The extent of the adjustment, if any, in the Contract Time.

7.2.2 Methods used in determining adjustments to the Contract Sum or Guaranteed Maximum Price may include those listed in Section 7.3.3.

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation. Sufficient substantiating data shall include a proposal itemized for the various components of work added or deleted, segregated by labor, material and equipment. Details to be submitted will include detailed line item estimates showing detailed material quality takeoffs, material prices by item, and of related labor hour pricing information and extension by line item by drawings as applicable);

.2 Unit prices stated in the Contract Documents or subsequently agreed upon and supported by sufficient substantiating data to permit evaluation;

.3 Cost to be determined in a manner agreed upon by the parties and a mutually-acceptable fixed or percentage fee or the percentage fee established at 7.1.5; or;

.4 As provided in Subparagraph 7.3.7.

7.2.3 Contractor stipulates that acceptance of a Change Order by the Contractor constitutes full accord and satisfaction for any and all Claims, whether direct or indirect, arising from the subject matter of the Change Order.

7.2.4 In no event shall a single change, or the aggregate of all changes, result in the total costs, reimbursements, and fees exceeding the Contract Sum or the Guaranteed Maximum Price, unless agreed to in writing by Owner prior to the commencement of such modified or changed Work.

7.2.5 Agreement on any Change Order shall constitute a final settlement of all claims by the Contractor directly or indirectly arising out of or relating to the change in the Work which is the subject of the Change Order, including, but not limited to, all direct and indirect costs and impact costs associated with such change and any and all adjustments to the Contract Sum and the Contract Time

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§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Guaranteed Maximum Price, or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum or Guaranteed Maximum Price, and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 The Construction Change Directive shall include a unilateral change in the Contract Sum and/or Contract Time reflecting the Owner's reasonable view of the appropriate change in the Contract Sum and/or Contract Time for the change in the work covered by the Construction Change Directive. Until agreement is reached by the Owner and Contractor on these issues, the change in Contract Sum and Contract Time set out in the Construction Change Directive shall be used for schedule of values, payment, and scheduling purposes.

~~If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:~~

- ~~.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation; Sufficient substantiating data shall include a proposal itemized for the various components of work added or deleted, segregated by labor, material and equipment. Details to be submitted will include detailed line item estimates showing detailed material quality takeoffs, material prices by item and of related labor hour pricing information and extension (by line item by drawings as applicable.~~
- ~~.2 Unit prices stated in the Contract Documents or subsequently agreed upon; and supported by sufficient substantiating data to permit evaluation.~~
- ~~.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or~~
- ~~.4 As provided in Section 7.3.4.~~

§ 7.3.4 [*Not used*] ~~If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:~~

~~.1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;~~

~~.2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;~~

~~.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;~~

~~.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and~~

~~.5 Costs of supervision and field office personnel directly attributable to the change.~~

§ 7.3.5 ~~If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.~~

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Guaranteed Maximum Price, or Contract Time.

§ 7.3.7 In the absence of agreement between Owner and Contractor on the proper change to the Contract Sum or Contract Time because of a change in the Work, Contractor may treat the matter as a Claim under Paragraph 15. In

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such event, the Contractor shall be entitled to recover only the amount by which its direct costs have been reasonably increased over the direct cost of performing the Work without the change in the work, plus three percent (3%) on Subcontractor's Work) of direct cost to cover home office overhead, profit, and all other costs. Direct costs shall be limited to the following:
~~A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.~~

.1 Reasonable Cost of Labor, including Social Security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;
.2 Materials, supplies and equipment, equipment including cost of transportation, whether incorporated or consumed;
.3 Rental cost of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others at rates that are no greater than market rates in the locale of the Work at the time of the Work. Unless otherwise established in the Contract, the rental value of the Contractor's own equipment shall not be more than normal local rental rates for contractor-owned equipment;
.4 Premiums for all bonds and insurance permit fees and sales, use or similar taxes related to the Work; and
.5 Cost of Subcontractor for performing the change in the Work. The amount allowable for Subcontractors shall be calculated using the same standards set out herein for direct Work by the Contractor.
.6 Additional cost of supervision and field office personnel directly attributable to the change.

Contractor and each Subcontractor involved shall furnish evidence of costs such as copies of original invoices for materials, payroll vouchers for labor, etc., upon request by the Architect, Owner, or Program Manager. Any increase in Contract Time shall be limited to the amount of time by which activities critical to overall completion of the Project are delayed by the change in the Work. If it is reasonably possible to perform the change in the Work concurrently with Work that is critical to overall completion, no time extension shall be granted by reason of a change in the Work.

§ 7.3.8 [*Not Used*] ~~The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that which results in a net decrease in the Contract Sum shall be actual net cost of the work deleted, including all profit and overhead, plus the Contractor's allocated percentage of three (3%) percent on Subcontractor's work of direct cost to cover supervision, field office and home office overhead, profit and all other costs cost When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.~~

§ 7.3.9 [Not Used] ~~Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.~~

§ 7.3.10 ~~When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.~~

§ 7.4 Minor Changes in the Work

With prior written notice to the Owner's representative, ~~T~~the Architect may order minor changes in the Work that are consistent with the ~~intent of the~~ Construction Documents or the Contract Documents and do not involve an adjustment in the Contract Sum or Guaranteed Maximum Price, or an extension of the Contract Time, nor requiring any payment from the Contingency Allowance. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Guaranteed Maximum Price, or Contract Time, or requiring a payment from the Contingency Allowance, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect

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the Contract Sum or Guaranteed Maximum Price, or Contract Time, or the Contingency Allowance, the Contractor waives any adjustment to the Contract Sum or Guaranteed Maximum Price, or extension of the Contract Time or the Contingency Allowance. The Contractor shall carry out such written orders promptly. Minor changes in the Work shall not include changes that involve the outward appearance of the structure, color schemes, floor plans, building materials, landscaping, or mechanical equipment

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for ~~Substant~~Final Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the ~~date established in the Agreement~~ first business day after Contractor's receipt of the written Notice to Proceed. The Notice to Proceed shall not be issued by Architect until the Contract (or Amendment, if Contractor is a Construction Manager at Risk) has been signed by the Contractor, approved by Owner's Board of Trustees, signed by the Owner's authorized representative, and Owner and Architect have received, and approved as to form, all required payment and performance bonds and insurance, in compliance with Article 11. Issuance of the Notice to Proceed shall not relieve the Contractor of its responsibility to comply with Article 11.

8.1.2.1 If the Notice to Proceed is delayed due to delays in issuance of the building permit by municipal authorities or other unanticipated delays, *and* if building materials are expected to increase in price due to that delay, Contractor may, if Owner expressly agrees in writing, purchase such materials before receiving the Notice to Proceed from Owner. Contractor shall store and insure such building materials until use. In the event the project is cancelled, Contractor's contract is terminated, or the materials are not used (in whole or in part) on the Project, Contractor shall sell the unused materials to Owner at Contractor's actual cost, or reduce its billing to Owner in that amount, if Contractor retains the material.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8. The date of Final Completion is the date certified by the Architect in accordance with Paragraph 9.10. Unless otherwise agreed in writing by Owner, Contractor agrees that Final Completion shall occur not more than 30 days after the date of Substantial Completion.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the ~~Agreement~~Contract, the Contractor ~~confirm~~stipulates that the Contract Time is a reasonable period for performing the Work.

If Contractor fails to achieve Substantial Completion of the Work on or before the date(s) specified for Substantial Completion in this Contract and the other Contract Documents, Contractor shall pay to the Owner, as liquidated damages, the sum set out in the Contract between Owner and Contractor for each calendar day that Substantial Completion is delayed after the date(s) specified for Substantial Completion. The total liquidated damage claim is determined by multiplying daily-liquidated damage amounts stated in the Contract by the number of days late. A fraction of a day shall be counted as a full day. It is hereby agreed that the actual damages which Owner will suffer by reason of late completion would be difficult to ascertain, and the liquidated damages to which Owner is entitled hereunder are a reasonable forecast of just compensation for the harm that would be caused by Contractor's failure to achieve Substantial Completion of the Work on or before the date(s) specified for Substantial Completion, and not a penalty. Liquidated damages shall be paid as they accrue and may be adjusted from any progress payment due.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, ~~,~~ prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance. Unless the date of commencement is established by the Contract Documents or a Notice to Proceed given by the Owner, the Contractor shall notify the Owner in writing not less than five (5) days or other agreed period.

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§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial and Final Completion within the Contract Time.

8.2.4 The Contractor is subject to liquidated damages, as specified in the Contract, if the Work is not completed by the date of Substantial Completion or the date of Final Completion.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress in performing work that is critical to overall completion of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of or Program Manager, or a Separate Contractor; (2) by changes ordered in the Work; (3) by ~~labor disputes,~~ fire, governmental actions~~unusual delay in deliveries~~, ~~unavoidable casualties,~~ or adverse weather conditions documented in accordance with Section 15.1.6.2~~, or other causes beyond the Contractor's control~~; (4) by delay authorized, in writing, by the Owner ~~pending mediation and binding dispute resolution~~; or (5) by other causes that the Contractor asserts, and the Owner and Architect determine~~s~~, may justify delay, then the Contract Time ~~sh~~may~~ll~~ be extended for such reasonable time as the Owner, ~~and~~ Architect or Program Manager may determine. Adjustments in the Contract Time will be permitted for a delay only to the extent such delay is not caused or could not have reasonably been anticipated by the Contractor, and could not be limited or avoided by the Contractor's timely notice to the Owner of the delay, and only if Contractor satisfies the conditions of this Paragraph 8.3. Contractor has the burden to prove that any of the foregoing alleged causes of delay significantly impacted construction progress on the critical path, as a condition precedent to any extension of the Contract Time.

The Contractor shall anticipate and include in the construction schedule lost time due to adverse weather conditions in accordance with the number of Lost Time Workdays per month in the Dallas area in accordance with the following schedule:

January – 5
February – 4
March – 5
April – 6
May – 6
June – 4
July – 4
August – 4
September – 5
October – 4
November – 4
December – 4

A request for a time extension based on unusually adverse weather conditions will not be permitted unless the cumulative actual days of Lost Time Workdays for the period when the critical path of the project is subject to impact from Lost Time Workdays exceeds the cumulative number of expected Lost Time Workdays for the same period. The final calculation of entitlement to a time extension cannot be made until at least sixty (60) days prior to the agreed date for Substantial Completion of the Project ~~is completed~~ and the time extensions for unusually adverse weather may not be made until that time. However, Contractor will submit claimed Lost Time Workdays in accordance with the submission times provided in 8.3.2. No day on which substantial Contractor forces are able to perform the work on the Project for more than fifty percent (50%) of the usual workday will be counted as a Lost Time Workday. Lost Time Workdays will not be calculated for any period when the critical path of the project is not subject to impact from adverse weather conditions.

§ 8.3.2 ~~Claims relating to time shall be made in accordance with applicable provisions of Article 15.~~ On or before the fifteenth (15th) day of each month of the Work, Contractor shall submit in writing a request for all time extensions to which it believes itself to be entitled for the preceding month, other than time extensions for changes in the Work, which are to be submitted in accordance with the requirements of Article 7. If Contractor's request for time extension for Changes in the Work is denied and Contractor wishes to pursue the matter, Contractor shall submit in writing a request for that extension by the fifteenth (15th) day of the month following the denial. Any claim for time extension not submitted under the terms of this Subparagraph shall be waived.

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8.3.2.1 Owner, after consultation with the Architect and Program Manager, shall grant time extensions to the extent it believes them to be proper. Time extensions granted by the Owner may be incorporated into schedules for completion of the Work. In the event that Contractor believes that it is entitled to additional time extensions beyond those granted by the Owner, it may make a claim for them provided it can meet the requirements of Paragraph 15.1.

§ 8.3.3 This Contract ~~Section 8.3~~ does not permit~~reclude~~ the recovery of damages, including, without limitation, extended home office overhead expenses, general conditions, or other consequential damages, by the Contractor for delay or disruption or for extensions of time due to bad weather or acts of God. Contractor agrees that the only possible compensation for any delay is an extension of time ~~by either party under other provisions of the Contract Documents~~.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the ~~Agreement~~Contract and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents. In the event that the Project is a Construction Management at Risk Project, the Contract Sum shall not exceed the Guaranteed Maximum Price.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices ~~shm~~ay~~ll~~ be equitably adjusted by prior written agreement.

§ 9.2 Schedule of Values

9.2.1 Before the first Application for Payment, ~~,~~ the Contractor shall submit a schedule of values to the Architect and Program Manager before the first Application for Payment, allocating the entire Contract Sum or, in the case of a Guaranteed Maximum Price, within 15 days after establishing the Guaranteed Maximum Price, to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect or Program Manager may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment. The schedule of values shall be prepared in such a manner that each major item of work, whether done by Contractor's own forces or subcontracted, is shown as a single line item on AIA Document G702 and G703, Application and Certificate for Payment and Continuation Sheet. If the Contractor is a Construction Manager at Risk, then the Contractor's fee and general conditions shall be specifically shown, and AIA Documents G702CMa and G703 shall be used.

9.2.2 ~~.~~If the Project is a Construction Manager at Risk project, in order to facilitate the review of Applicants for Payment, the Schedule of Values shall be submitted on AIA Documents G702 and G703, and shall include the following:

.1 Contractor's cost for Contractor's fee (if applicable) bonds and insurance, mobilization, or general conditions, etc. shall be listed as individual line item.

.2 Contractor's costs for various construction items shall be detailed. For example, concrete work shall be subdivide into footings, grade beams, floor slabs, or paving, etc.

.3 On major subcontracts, such as mechanical, electrical, and plumbing, the schedule shall indicate line items and amounts in detail (for example: underground, major equipment, fixtures, installation fixtures, or start-up, etc.)

.4 Costs for subcontract work shall be listed without any additional mark-up of Contractor's costs for overhead, profit, or supervision.

.5 If payment for stored materials is requested prior to installation, then material and labor shall be listed as separate line items.

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.6 Contractor shall provide a report of actual versus projected reimbursable expenses (general conditions), updated monthly.

§ 9.3 Applications for Payment

§ 9.3.1 At ~~least ten days before the date established for each progress payment~~, the time specified in the Contract, the Contractor shall submit to the Architect and Program Manager an itemized Application for Payment for operations completed prepared in accordance with the schedule of values~~, if required under Section 9.2, for completed portions of the Work~~. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage ~~if provided for in the Contract Documents~~.

§ 9.3.1.1 As provided in Section 7.3.8, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, but not yet included in Change Orders. Contractor agrees that, for purposes of Texas Government Code Sections 2251 and 2251.042, receipt of the Application for Payment by the Architect shall not be construed as receipt of an invoice by the Owner. Contractor further agrees that Owner's receipt of the Certificate for Payment shall be construed as receipt of an invoice by the Owner, for purposes of Texas Government Code Sections 251.021 and 2251.042~~As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders~~.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor ~~doe~~has not ~~intend~~ been invoiced by~~to pay~~ a Subcontractor or supplier, unless ~~such~~Contractor has self-performed the Work ~~has been performed by others whom the Contractor intends to pay~~.

9.3.1.3 Until Final Completion of the Work, the Owner shall withhold retainage as provided in the Contract Documents, except that Owner shall not pay amounts for which the Architect refuses to certify payment, or the Owner refuses to pay, as provided herein Section 9.4 or 9.5 as amended. The remaining retainage shall be paid with the Final Payment, unless there is a bona fide dispute between Owner and Contractor and the reason for the dispute is that labor, services, or materials provided by Contractor, or a person under Contractor's direction or control, failed to comply with the express terms of the Contract, or if the surety on any surety bond does not agree to the release of retainage. Written notice of the basis for withholding retainage under Texas Government Code Sections 2252.031 – 2252.032 must be provided to Contractor. If there is no bona fide dispute and neither party is in default, Contractor may cure any noncompliant labor, services, or materials, or offer Owner reasonable compensation for such noncompliant labor, services, or materials that cannot promptly be cured. Owner is not required to accept such offer.

§ 9.3.2 ~~Unless otherwise provided in the Contract Documents, p~~Payments ~~shaw~~ill be made on the basis of invoices for specific ~~account of~~ materials ~~and~~or equipment ~~delivered and suitably stored at the site for subsequent~~ incorporated~~ion~~ in the Work, and ~~. If approved in advance by the Owner, payment may similarly be made for~~ specific materials ~~and~~or equipment (1) suitably stored the site or (2) suitably stored at some off~~-the~~ site ~~at a~~ location, provided the following conditions are met for ~~agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored~~ off~~-the~~ site storage:

.1 The location must be agreed to, in writing, by Owner and Surety.
.2 The location must be a bonded warehouse.
.3 The Contractor's Surety must agree, in writing, to the amounts included in each Application for Payment.
.4 The Contractor must bear the cost of the Owner's and Architect's expenses related to visiting the off-site storage area and reviewing the stored contents. Contractor acknowledges that Architect's time may be an Additional Service and shall compensate Architect directly for same upon request.
.5 Payment shall not include any charges for overhead or profit on stored materials.
.6 Payments for materials or equipment stored on or off the site shall be conditioned upon submission by the Contractor of bills of sale or such other documentation satisfactory to the Owner to establish the

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Owner's title to such materials or equipment or otherwise protect the Owner's interest, including applicable insurance (naming the Owner as insured and naming the specific materials or equipment stored and their location) and proof of delivery to the site for those materials and equipment stored off the site. Under no circumstances will the Owner reimburse the Contractor for down payment, deposits, or other advance payment for materials or equipment until the materials or equipment are delivered to Owner's site or the agreed-upon off-site storage. Failure to follow these procedures shall result in nonpayment for storage of or insurance on stored materials and equipment. Failure to follow these procedures shall also result in nonpayment of materials and equipment until said materials and equipment are incorporated into the Work.

CONTRACTOR AGREES TO INDEMNIFY OWNER FROM ANY LOSS RESULTING FROM A BREACH OF THIS SECTION. Any off-site storage shall be in a bonded warehouse, suitably marked for the individual project, in addition to the requirements above

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work. Neither Contractor nor any of its materialmen, laborers, or Subcontractors shall have any lien rights against the Owner's lands, building funds, materials or other property. No materialmen, laborers or Subcontractor of the Contractor shall have any enforceable rights against the Owner of this Contract. Materialmen, laborers and Subcontractors of the Contractor may have rights under any Payment Bond provided by the Contractor, but cannot look to the Owner for any help in enforcement of those rights. CONTRACTOR SHALL WAIVE, RELEASE, INDEMNIFY, AND HOLD OWNER HARMLESS FROM ANY LIENS, CLAIMS, SECURITY INTERESTS OR ENCUMBRANCES FILED BY THE CONTRACTOR, SUBCONTRACTORS, OR ANYONE CLAIMING BY, THROUGH, OR UNDER THE CONTRACTOR OR SUBCONTRACTOR FOR ITEMS COVERED BY PAYMENTS MADE BY THE OWNER TO CONTRACTOR.

9.3.4 Contractor shall submit Applications for Payment, in quadruplicate, using AIA Documents G702 and G703 Application and Certificate of Payment (or G702CMa, if applicable) and Continuation Sheet or electronically, if acceptable to Owner. All blanks in the form must be completed and signatures of Contractor and Notary Public must be original on each form. Incomplete or inaccurate Applications for Payment shall be returned to the Contractor by the Architect for completion and/or correction. Owner shall have no responsibility for payment of same if the Application for Payment is incomplete or inaccurate.

9.3.5 By signing each Application for Payment, the Contractor stipulates and certifies to the following; that the information presented is true, correct, accurate, and complete; that the Contractor has made the necessary detailed examinations, audits, and arithmetic verifications; that the submitted Work has been completed to the extent represented in the Applications for Payment; that the materials and supplies identified in the Applications for Payment have been purchased, paid for, and received; that the subcontractors have been paid as identified in the Applications for Payment or that Contractor has been invoiced for same; that Contactor has made the necessary on-site inspections to confirm the accuracy of the Applications for Payment; that there are no known mechanics' or materialmens' liens outstanding at the date of the Applications for Payment; that all due and payable bills with respect to the Work have been paid to date or are included in the amount requested in the current Payment Application; that, except for such bills not paid but so included, there is no known basis for the filing of any mechanics' or materialmens' liens on the Work; that the Payment Application includes only Work self-performed by Contractor or for which Contractor has been invoiced; and that releases from all Subcontractors and materialmen have been obtained in such form as to constitute an effective release of lien under the laws of the State of Texas, covering all Work performed and for which payment has been made by the Owner to the Contractor. Contractor understands that documents submitted to Owner become government documents under the laws of the State of Texas. Contractor further understands that falsification of Contractor's Applications for Payment may constitute a violation of the penal laws of the State of Texas, including, but not limited to, Texas Penal Code Sections 32.46; 37.09, and 37.10, and may justify termination of Contractor's Contract with Owner. Contractor further understands and agrees that falsification of documents may entitle Owner to restitution as permitted by Texas law and these Contract Documents.

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§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, carefully evaluate and review the Applications for Payment and, when appropriate, return the Applications for Payment to the Contractor as provided in Section 9.3.4. If the Applications for Payment are complete, then the Architect shall sign and either (1) certify and issue to the Owner a Certificate for Payment in the full amount of the Applications for Payment, with a copy to the Contractor; or (2) certify and issue to the Owner a Certificate for Payment for such amount as the Architect and Program Manager determines is properly due, and notify the Contractor and Owner in writing of the Architect's or Program Manager reasons for withholding certification and disputing in part certification as provided in Section 9.5.1; or (3) withhold certification of the entire Applications for Payment, and notify the Contractor and Owner in writing with a detailed statement of the Architect's reason for withholding certification in whole in accordance with Texas Government Code Section 2251.042(a), and as provided in Section 9.5.1. Architect's written reason for withholding certification shall be submitted in accordance with, and construed as the notice required by Texas Government Code Section 2251.042 *et. seq.* Owner may not withhold from payments more than 110% of the disputed amount.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect or Program Manager to the Owner, ~~based on the Architect's evaluation of the Work and the data in the Application for Payment,~~ that the Architect has observed the progress of the Work and determined that, in the Architect's professional opinion, ~~to the best of the Architect's knowledge, information, and belief,~~ the Work has progressed to the point indicated, and the quality of the Work is in accordance with the Contract Documents. Further, the issuance of the Certificate for Payment will constitute a representation by the Architect or Program Manager to the Owner that the Architect or Program Manager has carefully evaluated and certified that the amounts requested in the Applications for Payment are valid and correct and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect or Program Manager in writing to the Owner. However, the issuance of a Certificate for Payment will not be a representation that the Architect and Program Manager has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data unless requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum. Examinations, audits, and verifications, if required by the Owner, will be performed by the Owner's accountants or other representatives of the Owner acting in the sole interest of the Owner.

9.4.3 The issuance of a Certificate for Payment shall constitute a recommendation to the Owner regarding the amount to be paid. This recommendation is not binding on the Owner if Owner knows of other reasons under the Contract Documents why payment should be withheld.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect or Program Manager may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's or Program Manager's opinion the representations to the Owner ~~required by Section 9.4.2 cannot be made~~. If the Architect or Program Manager is unable to certify payment in the amount of the Application, the Architect or Program Manager will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect or Program Manager cannot agree on a revised amount, the Architect or Program Manager will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect ~~t~~ or Program Manager may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's or Program Manager's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- **.4** reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- **.5** damage to the Owner or a Separate Contractor;

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.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; ~~or~~

.7 repeated failure to carry out the Work in accordance with the Contract Documents; or

.8 failure to submit a written plan indicating action by the Contractor to regain the time schedule for completion of Work within the Contract time.

§ 9.5.2 When ~~either party~~the Contractor disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, ~~that party~~the Contractor may submit a Claim in accordance with Article 15.

§ 9.5.3 Architect's written reason for withholding certification shall be construed as the notice required by Texas Government Code Section 2251.042 *et seq*~~When the reasons for withholding certification are removed, certification will be made for amounts previously withheld~~.

§ 9.5.4 Notwithstanding any provision contained within this Article, if the Work has not attained Substantial Completion or Final Completion by the required dates, subject to extensions of time allowed under the Contract Documents, ~~If~~ then Architect or Program Manager may withhold~~s~~ any further ~~c~~Certificate~~ion~~ for ~~p~~Payment ~~under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the~~ from Contractor to the extent necessary to preserve sufficient funds to complete construction of the Project and to cover liquidated damages. ~~failed to make payment for Work properly performed or material or equipment suitably delivered. If t~~The Owner shall not be deemed in default by reason of withholding ~~makes~~ payment~~s~~ as provided in Sections 9.3.4, 9.4.3, 9.5.1, or this Section ~~by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment~~.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment for undisputed amounts in the manner and within the time provided in the Contract Documents, and shall so notify the Architect. Owner shall notify Contractor within 21 days if Owner disputes the Architect's Certificate of Payment pursuant to Texas Government Code Section 2251.042 *et seq*, listing the specific reason for nonpayment. Payments to the Contractor shall not be construed as releasing the Contractor or his Surety from any obligations under the Contract Documents.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than ~~seven~~ ten days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner. In compliance with Texas Government Code Section 2251.022, the Contractor shall, within ten (10) days following receipt of payment from the Owner, pay all bills for labor and materials performed and furnished by others in connection with the Work, and shall, if requested, provide the Owner with evidence of such payment. Contractor shall include a provision in each of its subcontracts imposing the same payment obligations on its Subcontractors as are applicable to the Contractor hereunder, and if the Owner so requests, shall provide to the Owner copies of such Subcontractor payments. If the Contractor has failed to make payments promptly to the Contractor's Subcontractors or for materials or labor used in the Work for which the Owner has made payment to the Contractor, then the Owner shall be entitled to withhold payment to the Contractor, in part or in whole, to the extent necessary to protect the Owner. This Section is subject to the provisions of Texas Business and Commerce Code Chapter 56.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner, Program Manager nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier~~, except as may otherwise be required by law~~. Any action taken by Owner to require the Contractor to pay a Subcontractor shall not impose any liability on Owner to the Subcontractor or supplier.

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§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 ~~Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision~~. Payments received by the Contractor from the Owner for Work properly performed by Subcontractors, or materials properly provided by suppliers, shall be held in trust by the Contractor for the benefit of those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor. Texas Property Code § 162.001.

§ 9.6.8 ~~Provided the Owner has fulfilled its payment obligations under the Contract Documents, t~~THE CONTRACTOR SHALL DEFEND AND INDEMNIFY THE OWNER FROM ALL LOSS, LIABILITY, DAMAGE OR EXPENSE, INCLUDING REASONABLE ATTORNEY'S FEES AND LITIGATION EXPENSES, ARISING OUT OF ANY LIEN CLAIM OR OTHER CLAIM FOR PAYMENT BY ANY SUBCONTRACTOR OR SUPPLIER OF ANY TIER. UPON RECEIPT OF NOTICE OF A LIEN CLAIM OR OTHER CLAIM FOR PAYMENT, THE OWNER SHALL NOTIFY THE CONTRACTOR. IF APPROVED BY THE APPLICABLE COURT, WHEN REQUIRED, THE CONTRACTOR MAY SUBSTITUTE A SURETY BOND FOR THE PROPERTY AGAINST WHICH THE LIEN OR OTHER CLAIM FOR PAYMENT HAS BEEN ASSERTED.

9.6.9 Contractor shall not withhold as retainage a greater percentage from Subcontractors or materialmen than the percentage that Owner withheld as retainage from payments to Contractor.

§ 9.7 Failure of Payment

9.7.1 ~~If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or~~ Pursuant to Texas Government Code Section 2251.051, if the Owner does not pay the Contractor any payment certified by the Architect and Program Manager, which is undisputed, due and owing ~~within seven days~~ after the date the payment is due under the Contract Documents ~~established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution~~, then the Contractor ~~may~~, upon ~~s~~ten~~ven~~ (10) additional days' written notice to the Owner, Program Manager and Architect, that payment has not been made and the Contractor intends to suspend performance for nonpayment, may stop the Work until payment of the amount owing has been received. ~~The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents~~If the Owner provides written notice to the Contractor that: 1) payment has been made; or 2) a bona fide dispute for payment exists, listing the specific reasons for nonpayment, then Contractor shall be liable for damages resulting from suspension of the Work. If a reason specified is that labor, services, or materials provided by the Contractor are not provided in compliance with the Contract Documents, then the Contractor shall be provided a reasonable opportunity to cure the noncompliance or to compensate Owner for any failure to cure the noncompliance. No amount shall be added to the Contract Sum as a result of a dispute between Owner and Contractor unless and until such dispute is resolved in Contractor's favor.

9.7.2 ~~If the Architect does not issue a Certificate for Payment within seven (7) days after receipt of the Contractor's Application for Payment, through no fault of the Contractor, then the Contractor shall provide written notice to the Owner, and the Owner shall have fourteen (14) business days after receipt of such notice to provide or obtain a Certificate for Payment. If Owner fails to provide or obtain the Certificate for Payment, then the Contractor may, upon fourteen (14) additional business days' written notice to the Owner and Architect, stop the Work until payment of the undisputed amount owing has been received.~~[*Intentionally deleted*]

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9.7.3 If the Owner is entitled to reimbursement or payment from the Contractor under or pursuant to the Contract Documents, then such payment shall be made promptly upon demand by the Owner. Notwithstanding anything contained in the Contract Documents to the contrary, if the Contractor fails to promptly make any payment due to Owner, pursuant to the Contractor, or if the Owner incurs any costs and expenses to cure any default of the Contractor or to correct defective Work, then the Owner shall have an absolute right to offset such amount against the Contract Sum and, in the Owner's sole discretion and without waiving any other remedies, may elect either to:

.1 deduct an amount equal to that which the Owner is entitled from any payment then or thereafter due to Contractor form the Owner, or

.2 issue a written notice to the Contractor reducing the Contract Sum by an amount equal to that which the Owner is entitled.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use; all Project systems included in the Work or designated portion thereof have been successfully tested and are fully operational; all required governmental inspections and certifications required by the Work have been made, approved, and posted; designated initial instruction of Owner's personnel in the operation of Project systems has been completed; and all the required finishes set out in the Construction Documents are in place. The only remaining Work shall be minor in nature so that the Owner can occupy the Work or the applicable portion of the Work for all of its intended purposes on that date; and the completion of the Work by the Contractor will not materially interfere with or hamper Owner's, or Owners' tenant normal school operations, or other intended use. As a further condition of a determination of Substantial Completion, the Contractor shall certify that all remaining Work with respect thereto will be completed within the time specified by the Contract Documents for Final Completion. As provided in the Contract Documents, Owner may occupy a portion of the facility prior to Substantial Completion.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Architect and Program Manager shall prepare ~~shall prepare~~ and a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect and Program Manager will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, then the Architect shall so notify the Contractor, Program Manager and Owner in writing, and the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion. Except with the consent of the Owner, the Architect shall perform no more than five (5) inspections to determine whether the Work or a designated portion thereof has attained Substantial Completion in accordance with the Contract Documents. The Owner shall be entitled to reimbursement from the Contractor for amounts paid to the Architect for any additional inspections.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will timely prepare, sign and issue Owner's ~~a~~ Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of ~~Substantial~~ Final Completion of the Work or designated portion ~~thereof unless otherwise provided in the Certificate of Substantial Completion~~.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. ~~Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.~~

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9.8.6 The Contractor shall keep all required insurance in full force, and utilities on, until the Certificate of Substantial Completion is issued, and accepted by the Owner in writing, regardless of the stated date of Substantial Completion, subject to 11.2.2. Acceptance shall not be unreasonably withheld.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when ~~such portion is designated by separate agreement with~~agreed to by the Owner and the Contractor ~~in writing, provided such occupancy or use is consented to by the insurer and~~ authorized by public authorities having jurisdiction over the ~~Project~~Work. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided that the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work resulting from such occupancy, use or installation, and property and liability insurance, ~~and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2.~~ Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect. Contractor agrees that the Owner may place and install as much equipment and furnishings as is possible before completion or partial completion of portions of the Work.

§ 9.9.2 Immediately prior to such partial occupancy, ~~or~~ use, or installation, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless ~~otherwise~~ expressly agreed upon in writing, partial occupancy or use of a portion or portions of the Work or installation of furnishings and equipment shall not constitute acceptance of Work not complying with the requirements of the Contract Documents, nor shall it constitute evidence of Substantial Completion or Final Completion.

9.9.4 In the event that Owner takes partial occupancy or installs furnishings and equipment prior to Substantial Completion of the Project. Contractor shall obtain an endorsement to Contractor's Builder's Risk Policy to provide extended coverage for partial occupancy if Contractor's Builder's Risk Coverage required by Article 11 would not otherwise provide such coverage.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect and the Program Manager finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect and the Program Manager will promptly prepare, sign, and issue Owner's Certificate of Final Completion and a final Certificate for Payment ~~stating that to the best of the Architect's knowledge, information and belief,~~ certifying to the Owner that, ~~and~~ on the basis of the Architect's and the Program Manager's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance, including all retainages, found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's and the Program Manager final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled. Final payment shall be made by the Owner in accordance with Owner's regular schedule for payments. Architect is not required to perform more than two inspections to determine whether a designated portion of the Work has attained Final Completion in accordance with the Contract Documents. One inspection may require multiple visits and more than one day to complete The Owner shall be entitled to reimbursement from the Contractor for amounts paid to the Architect for any additional inspections cause by act or commission of Contractor.

9.10.1.1 Final Completion means actual completion of the Work, including any extras or Change Orders reasonably required or contemplated under the Contract Documents other than warranty work as further defined in the Form of Contractor's Final Completion Notice attached hereto and incorporated herein as Exhibit "D

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) using AIA Document G706, an affidavit that payrolls, bills for materials and equipment, and

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other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) ~~a certificate~~ evidencing satisfactory to Owner that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) using AIA Document G707, consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) ~~if required by the Owner,~~ except for amounts previously withheld by the Owner, other data establishing payment or satisfaction of obligations, such as AIA Document G706A, notarized subcontractor's lien releases, receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees. In addition, the following items must be completed and received by the Owner before Final Payment will be due:

.1 Written certifications required by Sections 10.5, 10.6, and 10.7;
.2 Final list of subcontractors (AIA Document G705);
.3 Contractor's certification in Texas Education Agency's Certification of Project Compliance, located at www.tea.state.tx.us/school.finance/facilities/cert_2004.pdf;
.4 Contractor's warranties, organized as required elsewhere in the Contract Documents;
.5 Maintenance and Instruction Manuals;
.6 Owner's Final Completion Certificate; and
.7 "As-constructed record drawings." At the completion of the Project, the Contractor shall submit one (1) complete set of "as-constructed" record drawings, with all changes made during construction, including concealed mechanical, electrical, and plumbing items. The Contractor shall submit these as electronic, sepia, or other acceptable medium, in the discretion of the Owner. The "as-constructed" record drawings shall delete the seal of the Architect and/or the Engineer and any reference to those firms providing professional services to the Owner, except for historical or reference purposes.

Documents identified as affidavits must be notarized. All manuals will contain an index listing the information submitted. The Index section will be divided and identified by tabbing each section as listed in the index. Upon request, the Architect will furnish the Contractor with blank copies of the forms listed above. Final payment shall be paid by the Owner to the Contractor within thirty (30) days after Owner's Board of Trustees has voted to accept the Work and approve Final Payment.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, ~~except that~~and it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall not constitute a waiver of any Claims by the Owner~~, except those arising from~~

~~.1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;~~
~~.2 failure of the Work to comply with the requirements of the Contract Documents;~~
~~.3 terms of special warranties required by the Contract Documents; or~~
~~.4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.~~

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously asserted pursuant to Article 15~~made in writing~~ and identified by that payee as unsettled at the time of final Application for Payment.

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ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract and shall conform to all provisions of the "Manual of Accident Prevention in Construction," published by the Associated General Contractors of America, Inc., latest edition, and the Contractor further agrees to fully comply with all safety standards required by the Occupational Safety and Health Administration ("OSHA") 29 U.S.C. Section 651 *et seq*., and all amendments thereto. However, the Contractor's duties herein shall not relieve any Subcontractor or any other person or entity, including any person or entity required to comply with all applicable federal, state, and local laws, rules, regulations, and ordinances from the obligation to provide for the safety of their employees, persons, and property and their requirements to maintain a work environment free of recognized hazards. Contractor shall provide reasonable fall protection safeguards and provide approved fall protection safety equipment for use by all exposed Contractor employees.

10.1.2 Contractor's employees, agents, Subcontractors, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, shall not perform any service for Owner while under the influence of any amount of alcohol or any illegal controlled substance; or use, possess, distribute, or sell alcoholic beverages while on Owner's premises. No person shall: use, possess, distribute, or sell illegal or nonprescribed controlled drugs or drug paraphernalia; misuse legitimate prescription or over-the-counter drugs; or act in contravention of warnings on medications while performing the Work or while on Owner's premises. Contractor's employees, agents, Subcontractors, or anyone directly or indirectly employed by any of them, shall not distribute or sell alcohol or drugs of any kind to Owner's students or staff, regardless of the location of the distribution or sale.

10.1.3 Contractor will comply with all applicable federal, state, and local drug and alcohol-related laws and regulations (e.g., Department of Transportation regulations, Drug-Free Workplace Act). Contractor has adopted or will adopt its own policy to assure a drug-free and alcohol-free workplace while on Owner's premises or performing the Work. Contractor will remove any of its employees, agents, subcontractors, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, from performing the Work any time there is suspicion of alcohol and/or drug use, possession, or impairment involving such person, and at any time an incident occurs where drug or alcohol use could have been a contributing factor. Owner has the right to require Contractor to remove any person from performing the Work any time cause exists to suspect alcohol or drug use. In such cases, the person so removed may only be considered for return to work after the Contractor certifies, as a result of a for-cause test, conducted immediately following removal, that said person was in compliance with this Contract. Contractor will not use any person to perform the Work who fails or refuses to take, or tests positive on, any for-cause alcohol or drug test.

10.1.4 Owner has also banned the presence of all weapons on the Project site, whether or not the owner thereof has a permit for a weapon, and Contractor agrees that Contractor's representatives, employees, agents, and subcontractors will abide by same. Weapons may only be permitted in Owner's parking lots if weapons are locked in personal vehicles in Owner's parking lot.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- **.1** employees on the Work, school personnel, students, and other persons on Owner's premises, and other persons who may be affected thereby, including the installation of fencing between the Work site and any connecting or adjacent property of Owner, when required by Texas Education Code Section 22.08341;
- **.2** the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
- **.3** other property at the site or adjacent thereto, such as other buildings, and their contents, fencing, trees, shrubs, lawns, walks, athletic fields, facilities and tracks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

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§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including installing fencing, posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards. The Contractor shall also be responsible, at the Contractor's sole cost and expense, for all measures necessary to protect any personal or real property adjacent to the project and improvements therein. Any damage to such property or improvements shall be promptly repaired by the Contractor.

§ 10.2.4 When use or storage of ~~explosives or other~~ hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel and shall only conduct such activities after giving reasonable advance written notice of the presence or use of such materials, equipment, or methods to Owner and ~~Architect~~. The storage of explosives on Owner's property is prohibited. The use of explosive materials on Owner's property is prohibited unless expressly approved in advance in advance by authorities having jurisdiction, in writing, by Owner and Architect. When use or storage of hazardous materials or equipment or unusual construction methods are necessary, the Contractor shall give the Owner, Program Manager and the Architect reasonable advance notice of the presence or use of such materials, equipment or methods.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, ~~.~~ except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. ~~The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor.~~ The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect. Additionally, Contractor shall submit a Safety Plan for the Owner's approval prior to commencing the Work.

Unless otherwise specified in the Contract Documents, Contractor shall be responsible for initiating, maintaining, supervising, and enforcing all safety precautions and programs in connection with the Work. It shall be the duty and responsibility of the Contractor and all of its Subcontractors to be familiar and comply with all requirements of ~~Public Law 91-596,~~ 29 U.S.C. §§ 651 *et. ~~S~~seq.*, the Occupational Safety and Health Act of 1970, (OSHA) and all amendments thereto, and to enforce and comply with all of the provisions of the Act. Contractor shall comply with all applicable laws and regulations of any public body having jurisdiction for safety of persons or property to protect them from damage, injury or loss and shall erect and maintain all necessary safeguards for such safety and protection. However, the Contractor's duties shall not relieve any subcontractor(s) or any other person or entity (e.g., a supplier) including any person or entity with liability relative to compliance with all applicable federal, state and local laws, rules, regulations, and ordinances which shall include the obligation to provide for the safety of their employees, persons, and property and their requirements to maintain a work environment free of recognized hazards.

§ 10.2.7 The Contractor shall not load or permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

10.2.8 The Contractor shall do all things reasonably necessary to protect the Owner's premises and all persons from damage and injury when all or a portion of the Work is suspended for any reason.

10.2.9 The Contractor shall promptly report, in writing, to the Owner, Program Manager and Architect all accidents arising out of or in connection with the Work which causes death, bodily injury, or property damage, giving full details and statements of any witnesses. In addition, if death, serious bodily injuries, or serious property damages are caused, then the accident shall be reported immediately by any means necessary to give actual notice to the Owner's representative, Program Manager and the Architect.

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10.2.10 Contractor's obligations under Section 10.2 as to each portion of the Project shall continue until Owner takes possession of and occupies that portion of the Project.

§ 10.2.11~~8~~ Injury or Damage to Person or Property

If either party to the Contract suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The written notice shall provide sufficient detail to enable the other party to investigate the matter. Contractor understands and acknowledges that, under Texas law, Owner has sovereign and/or governmental immunity as to all torts except as to the Owner's permitted use or operation of Owner's motor vehicles, subject to any defenses under law.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify, in writing, the Owner and Architect of the condition. In the event the Contractor encounters polychlorinated biphenyl (PCB), and the specifications require the PCB's removal, the Contractor shall remove the PCB and store it in marked containers at the jobsite provided by the Owner. If PCBs are found which are leaking, then Contractor shall stop work on the affected fixture and shall contact Owner for removal and disposal of the leaking PCBs.

10.3.1.1 In the event Contractor encounters on the Project site any Hazardous Substance, or what Contractor may reasonably believe to be a Hazardous Substance, and which is being introduced to the Work, or exists on the Project site, in a manner in violation of any applicable Environmental Laws, Contractor shall immediately stop work in the area affected and report the condition to Owner, Program Manager and Architect in writing

§ 10.3.2 The Work in the affected area shall not thereafter be resumed except by written authorization of Owner if in fact a Hazardous Substance has been encountered and has not been rendered harmless. Contractor shall be responsible for the consequences of any failure to stop work under this Subparagraph 10.3. ~~Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up~~The Contractor may be entitled to an equitable adjustment regarding the Date of Substantial Completion and/or Final Completion.

§ 10.3.3 IF THE CONTRACTOR IMPORTS HAZARDOUS MATERIALS ONTO THE PROJECT SITE, THEN CONTRACTOR HEREBY ~~TO THE FULLEST EXTENT PERMITTED BY LAW, THE OWNER SHALL~~ INDEMNIFIES~~Y~~ AND HOLD HARMLESS THE OWNER, ITS ~~CONTRACTOR, SUBCONTRACTORS, ARCHITECT, ARCHITECT'S~~ CONSULTANTS, TRUSTEES, OFFICERS, ~~AND~~ PROGRAM MANAGER, AGENTS AND EMPLOYEES ~~OF ANY OF THEM FROM AND~~ AGAINST ANY CLAIMS~~, DAMAGES, LOSSES, AND EXPENSES, INCLUDING BUT NOT LIMITED TO ATTORNEYS' FEES~~, ARISING OUT OF OR RELATING TO ~~RESULTING FROM~~SUCH IMPORTATION, INCLUDING BUT NOT LIMITED TO ~~PERFORMANCE OF THE WORK IN THE AFFECTED AREA IF IN FACT THE MATERIAL OR SUBSTANCE PRESENTS THE RISK OF BODILY INJURY OR DEATH AS DESCRIBED IN SECTION 10.3.1 AND HAS NOT BEEN RENDERED HARMLESS, PROVIDED THAT SUCH CLAIM, DAMAGE, LOSS, OR EXPENSE IS~~

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~~ATTRIBUTABLE TO BODILY INJURY, SICKNESS, DISEASE OR DEATH, OR TO INJURY TO OR DESTRUCTION OF TANGIBLE PROPERTY (OTHER THAN THE WORK ITSELF), EXCEPT TO THE EXTENT THAT SUCH DAMAGE, LOSS, OR EXPENSE IS DUE TO THE FAULT OR NEGLIGENCE OF THE PARTY SEEKING INDEMNITY~~COSTS AND EXPENSES THE OWNER INCURS FOR REMEDIATION OF A MATERIAL OR SUBSTANCE THE CONTRACTOR BRINGS TO THE SITE, AS PROVIDED FOR IN SUBPARAGRAPH 3.18.

~~For purposes of this Agreement, the term "Hazardous Substance" shall mean and include any element, constituent, chemical, substance, compound, or mixture, which are defined as a hazardous substance by any applicable local, state or federal law, rule, ordinance, by-law, or regulation pertaining to environmental regulation, contamination, clean-up or disclosure, including, without limitation, The Comprehensive Environmental Response, Compensation and Liability Act of 1980 ("CERCLA"), The Resource Conservation and Recovery Act ("RCRA"), The Toxic Substance Control Act ("TSCA"), The Clean Water Act ("CWA"), The Clean Air Act ("CAA"), and the Marine Protection Research and Sanctuaries Act ("MPRSA"). The Occupational Safety and Health Act ("OSHA"), The Superfund Amendments and Reauthorization Act of 1986 ("SARA"), or other state superlien or environmental clean-up or disclosure statutes including all state and local counterparts of such laws (all such laws, rules and regulations being referred to collectively as "Environmental Laws"). It is the Contractor's responsibility to comply with this Paragraph 10.3 based on the law in effect at the time its services are rendered and to comply with any amendments to those laws for all services rendered after the effective date of any such amendments.~~

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site ~~unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances~~.

§ 10.3.5 For purposes of this ~~Agreement~~Contract, the term "Hazardous Substance" shall mean and include any element, constituent, chemical, substance, compound, or mixture, which are defined as a hazardous substance by any applicable local, state or federal law, rule, ordinance, by-law, or regulation pertaining to environmental regulation, contamination, clean-up or disclosure, including, without limitation, The Comprehensive Environmental Response, Compensation and Liability Act of 1980 ("CERCLA"), The Resource Conservation and Recovery Act ("RCRA"), The Toxic Substance Control Act ("TSCA"), The Clean Water Act ("CWA"), The Clean Air Act ("CAA"), and the Marine Protection Research and Sanctuaries Act ("MPRSA"). The Occupational Safety and Health Act ("OSHA"), The Superfund Amendments and Reauthorization Act of 1986 ("SARA"), or other state superlien or environmental clean-up or disclosure statutes including all state and local counterparts of such laws (all such laws, rules and regulations being referred to collectively as "Environmental Laws"). It is the Contractor's responsibility to comply with this Paragraph 10.3 based on the law in effect at the time its services are rendered and to comply with any amendments to those laws for all services rendered after the effective date of any such amendments.~~The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.~~

§ 10.3.6 In those instances in which the presence of a Hazardous Substance was set forth in the AHERA documents or In which the Contractor has other written notice of such through information given to Contractor by Owner or its representative prior to execution of the ~~Agreement~~Contract, Contractor shall not be entitled to a Claim for any delays, disruption or interference it encounters. In those instances of Work stoppage due to the existence of such Hazardous Substances which were not set forth in the AHERA plans and of which the Contractor has no other prior notice, Contractor may be entitled to a Claim for delay or Work stoppage if the requirements of Article 15 are not met. ~~If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.~~

§ 10.4 Emergencies

10.4.1 In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.~~Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.~~

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10.4.2 The performance of the foregoing services by the Contractor shall not relieve the subcontractors of their responsibility for the safety of persons and property and or compliance with all federal, state, and local statutes, rules, regulations, and orders of any governmental authority applicable to the conduct of the Work.

10.5 ASBESTOS OR ASBESTOS-CONTAINING MATERIALS

10.5.1 Contractor shall submit to the Architect a written certification addressed to the Owner that all materials used in the construction of this Project contain less than 0.10% by weight of asbestos and for which it can be demonstrated that, under reasonably foreseeable job site conditions, will not release asbestos fibers in excess of 0.1 fibers per cubic centimeter. The written certification shall further state that, should asbestos fibers be found at this Project in concentrations greater than 0.1 fibers per cubic centimeter, then Contractor shall be responsible for determining which materials contain asbestos fibers and shall take all necessary corrective action to remove those materials from the Project, at no additional cost to the Owner. The written certification shall be dated, shall reference this specific Project, and shall be signed by not less than two (2) officers of the Contractors.

10.5.2 Final Payment shall not be made until this written certification has been received.

10.6 LEAD-FREE MATERIAL IN POTABLE WATER SYSTEM

10.6.1 Prior to payment of retainage and final payment, the Contractor and each subcontractor involved with the potable water system, shall furnish a written certification that the potable water system is "lead-free."

10.6.2 The written certification shall further state that should lead be found in the potable water system built under this Project, then Contractor shall be responsible for determining which materials contain lead and shall take all necessary corrective action to remove lead from the Project, at no additional cost to the Owner. The written certification shall be dated, shall reference this specific Project, and shall be signed by not less than two (2) officers of the Contractor.

10.7 HAZARDOUS MATERIALS CERTIFICATION

The Contractor shall provide written certification that no materials used in the Work contain lead or asbestos materials in them in excess of amounts allowed by federal, state, or local standards, laws, codes, rules and regulations; the Federal Environmental Protection Agency (EPA) standards; and/or the Federal Occupational Safety and Health Administration (OSHA) standards, whichever is most restrictive. The Contractor shall provide this written certification as part of submittals under the Section in the Project Manual related to Contract Closeout.

ARTICLE 11 INSURANCE AND BONDS

11.0.1 No Work will be commenced, and no equipment or materials can be shipped, until all requirements of this Article have been satisfied, satisfactory evidence of insurance has been provided, and all insurance is in full force and effect. Contractor shall notify Owner, Program Manager and Architect, in writing, of any proposed nonconformity with these requirements, and shall notify Owner, Program Manager and Architect, in writing, of any insurance changes which occur during the terms required under the Contract Documents. Any deviation from these requirements can only be approved by Owner's Board of Trustees. Any nonconformity may be grounds for termination or modification of the Contract. To the extent that Contractor is unable to procure the insurance designated herein because the insurance is not reasonably available or is cost-prohibitive, then Contractor shall provide written notice to Owner's Board of Trustees. Said lack of insurance may then be grounds for termination or modification of this Contract.

11.0.2 Satisfactory evidence of insurance required by this Article shall be provided to Owner, Program Manager and Architect not later than five (5) business days after execution of the Contract by Contractor. Satisfactory evidence shall include copies of all required insurance policies, declarations, and endorsements themselves. In addition, Contractor shall also provide a duly-executed ACORD Form 25 Certificate of Liability Insurance naming Owner as a certificate holder and additional insured (except as noted in Section 11.0.4) and attaching all endorsements required herein. The Contractor shall furnish Owner all insurance amendments, renewals, notices, cancellations, and additional endorsements, as they are provided to Contractor.

11.0.3 All insurance required herein shall be obtained from a company licensed to do business with the State of Texas by the Texas Department of Insurance, and shall be underwritten by a company rated no less than "A-" X in A.M. Best's Key Rating Guide, Property-Casualty, according to the latest posted ratings available on A.M. Best's website, www.ambest.com, and that permits waivers of subrogation.

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11.0.4 ~~All insurance required herein shall name the Owner, its officers, employees, representatives, or agents, as an additional insured, except Contractor's Worker's Compensation insurance.~~ All liability insurance required herein shall name Dallas ISD, it's officers, employees, volunteers, elected officials, Program Managers, Architects and their officers, employees, representatives, risk management consultants, or agents, as additional insureds, except Contractor's Worker's Compensation insurance and Professional Liability insurance.

11.0.5 ~~All insurance required herein shall, by endorsement, be primary and non-contributory insurance with respect to the Owner, its officers, employees, representatives, or agents. All insurance shall be written on an occurrence basis, if available, and shall contain a waiver of subrogation in favor of Owner as provided for in Section 11.3.~~ All insurance required herein shall be primary insurance as respects the additional insured required by 11.0.4. Any insurance maintained by an additional insured shall be in excess of such insurance and shall not contribute with such primary insurance. All insurance shall be written on an occurrence basis where reasonably available, with the exception of professional liability policies, and shall contain a waiver of subrogation in favor of- the Owner, Program Manager, and Architect on all claims arising out of the Project. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, or did not pay the insurance premium directly or indirectly; and whether or not the person or entity had an insurable interest in the property damaged.

11.0.6 Any failure of Contractor to comply with the reporting provision of the policies shall not affect the coverage provided to the Owner, its officers, employees, representatives, or agents.

11.0.7 All workers on the Project must be covered by the required insurance policies of the Contractor or a Subcontractor. Contractor shall be responsible for all policy deductibles and self-insured retentions.

11.0.8 Nothing contained in this Article shall limit or waive Contractor's legal or contractual responsibilities to Owner or others. Contractor will cooperate with Owner or its designated representative to expeditiously resolve claims involving injuries to third parties, damage to the Work, or project delays. This cooperation will include providing Owner with monthly insurance carrier summary reports of builder's risk, general liability, professional liability and pollution liability claims pertaining to the Owner's projects. Contractor will provide Owner with Contractor and insurance carrier contact names and phone numbers. Contractor will be responsible for timely reporting of all claims and regulatory requirements, including MMSEA Section 111.

11.0.9. Maximum Allowable Charges for CMAR CCIP Programs

In the event that the Contractor elects to utilize a Contractor Controlled Insurance Program (CCIP) the maximum to be considered reimbursable costs under this Contract will be 2% of the final Cost of the Work (including general conditions costs) but not including Contractor Fee or CCIP charges and not including the costs of any subcontracts that included the cost of insurance covered by CCIP.

This 2% cost factor will cover all insurance required to be carried by the prime contractor and all applicable subcontractors covered by this Contract (specifically 1% for worker's compensation insurance, and 1% total for general liability insurance, excess liability insurance, and umbrella liability insurance combined).

Any contractor costs incurred in connection with the Contractor's elected CCIP program that exceeds the amount reimbursed by the Owner under the formula in this section, will be considered to be covered by the Contractor's Fee. Note: Contractor will not be reimbursed for any deductible stated in the CCIP policy. The deductible is considered covered by the CCIP percent and/or the Contractor Fee.

11.0.10 Maximum Allowable Charges for CMAR Liability Insurance Required by Contract

For jobs not covered by Owner Controlled Insurance Programs (OCIP) or Contractor Controlled Insurance Programs (CCIP), the amount to be reimbursed to the Contractor for all contractually required liability insurance (professional liability, general liability, umbrella liability, excess liability, and auto liability will be actual costs not to exceed a total of .~~65~~% of the net reimbursable Cost of Work (not including liability insurance and not including Contractor Fee.) If the Contractor's cost of contractually required liability insurance is greater than the amount agreed to be reimbursed per this Contract provision, the difference shall be considered to be covered by the Contractor's Fee. For

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jobs covered by CCIP or OCIP, the costs of any other liability insurance will be considered to be covered by the Contractor's Fee.

11.0.11 Maximum Allowable Charges for Subcontract Default Insurance provided by CMAR in lieu of Subcontract Performance Bonds

In the event that Contractor elects to utilize a subcontractor default insurance program (sometimes referred to as SUBGUARD), the maximum amount to be considered reimbursable costs under this Contract will be .75% of the total amount of subcontracts enrolled in such an insurance program. Reimbursement for enrollment in any such program will be limited to subcontracts in excess of $~~2~~500,000.

Any Contractor costs incurred in connection with the Contractor's elected subcontractor default insurance program that exceeds the amount reimbursed by the Owner under the formula in this section, will be considered to be covered by the Contractor's Fee. In the event that Contractor elects to bond selected subcontractors rather than enroll them in the subcontractor default insurance program, the net cost to purchase any such bonds will be reimbursed in lieu of the .75%. Note: Contractor will not be reimbursed for any deductible stated in the Subguard policy. The deductible is considered covered by the .75% and/or the Contractor Fee.

In the event that the Contractor elects to provide Subguard or a similar program of subcontractor default insurance, then the program and the coverage provided by the Contractor shall extend to any additional costs incurred by the Contractor to replace or supplement the forces of a subcontractor to provide the Work, and such circumstances shall include, but not be limited to, any partial or full termination of the contract of a subcontractor for convenience or otherwise, unless the Owner specifically directs the Contractor, in writing, to terminate the contract of a subcontractor for convenience.

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor and the Contractor's Subcontractors shall purchase and maintain, in a company or companies with a "Best Rating" of "A minus" or better, and licensed to do business in the State of Texas, such insurance as will protect, the Contractor, them and the Owner, Program Manager and Architect~~the Owner~~, from claims that may arise out of, or result from, the Contractor's operations under the Contract, whether such operations be by Contractor or by any Subcontractor, or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable, at a minimum of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in this Section 11.1, in the ~~Agreement~~Contract or elsewhere in the Contract Documents. ~~The Contractor shall purchase and maintain the required~~ Such insurance shall include the following:~~from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.~~

.1 Claims under workers' compensation, disability benefit, and other similar employee benefit acts that are applicable to the Work to be performed, including private entities performing work at the site, and exempt from the coverage on account of number of employees or occupation, which entities shall maintain voluntary compensation coverage at the same limit specified for mandatory coverage for the duration of the Project (see Exhibit A).

.2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;

.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;

.4 Claims for damages insured by usual personal injury liability coverage;

.5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;

.6 Claims for damages because of bodily injury, death of a person, or property damages arising out of ownership, maintenance, or use of a motor vehicle;

.7 Claims for bodily injury or property damage arising out of completed operations;

.8 Claims involving contractual liability insurance applicable to the Contractor's obligations under the Contract Documents, including under Section 3.18;

.9 Claims for Products, Premises and Operations; and

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.10 Claims for damages to the Work itself, through builder's risk insurance, pursuant to AIA A101-2017, Exhibit A, or AIA A133-2019, Exhibit ~~B~~A.

§ 11.1.2 The insurance required by Subparagraph 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from date of commencement of the Work until date of final payment and termination of any coverage required to be maintained after final payment, and with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.~~The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.~~

~~8. Contractor's Professional Liability, if applicable~~

~~If the Work performed by the Contractor or its subcontractors will include some responsibility for design, the Contractor will purchase or cause to be purchased and maintained a professional liability policy. The limits of coverage will not be less than:~~

~~$1,000,000 each claim and annual aggregate~~

~~Coverage will include:~~
~~A waiver of subrogation in favor of Owner, Program Manager and Architect~~
~~A retroactive date that is the earlier of the start of design or the Work~~
~~Coverage for negligent acts, errors or omissions arising out of design or engineering services~~
~~An extended reporting period of 5 years after final completion~~

9. All Risk Builder's Risk Insurance, if applicable

If Contractor is a Construction Manager-at-Risk, then, as specified in Amendment Number One, in a total amount equal to the Guaranteed Maximum Price; otherwise, in the total amount of the Contract Sum. See Section 11.4 for Builder's Risk Insurance requirements.

11.1.2.1 The Contractor shall furnish separate payment and performance bonds covering faithful performance of the Contract and payment of obligations arising thereunder, each bond to be in a total amount equal to 100% of the Contract Sum or Guaranteed Maximum Price, if the Project is a Construction Manager at Risk project, whichever is applicable. Provided, however, no limitation herein shall limit Contractor's liability under the Contract Documents. Except as provided below, such bond shall be furnished to Owner before any work begins and not later than five (5) business days after execution of the Contract by Owner. (If the Guaranteed Maximum Price is not known at the time that a Construction Manager at Risk contracts is awarded, then the sum of the payment and performance bonds must each be in an amount equal to the Project budget. The Construction Manager at Risk shall deliver the bonds not later than the tenth (10^{th}) day after the date of the Construction Manager at Risk executes the Contract, unless the Construction Manager at Risk furnished a bid bond or other financial security acceptable to the Owner to the District to ensure that the Construction Manager will furnish the required payment and performance bonds when the Guaranteed Maximum Price is established.) All bond shall be issued by a surety company licensed, listed and authorized to issue bonds in the State of Texas by the Texas Department of Insurance, and shall fully comply with Texas Insurance Code Section 3503.001 *et seq*. and Texas Government Code Chapter 2253, or their successors. The surety company shall have a rating of not less than "A-"X according to the latest posted ratings on the A.M. Best website, www.ambest.com. The surety company shall provide, if requested, information on bonding capacity and other projects under coverage and shall provide proof to establish adequate financial capacity for this Project. Should the bond amount be in excess of ten (10%) percent of the surety company's capital and surplus, then the surety company issuing the bond shall certify that the surety company has acquired reinsurance, in a form and amount acceptable to the Owner, to reinsure the portion of the risk that exceeds ten (10%) percent of the surety company's capital and surplus with one or more insurers who are duly authorized and admitted to do business in Texas and that amount reinsured by a reinsurer does not exceed ten (10%) percent of the reinsurer's capitals and surplus. Contractor shall immediately notify the Owner and Architect in writing if there is any change in: the rating; insolvency or receivership in any State; bankruptcy; right to do business in the State; or status of Contractor's sureties at any time until Final Completion.

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If the Contract amount is $100,000 or more, the Contractor shall furnish a Performance Bond equal to one hundred percent (100%) of the Contract Sum. If the Contract amount is $25,000 or more, the Contractor shall furnish a Payment Bond equal to one hundred percent (100%) of the Contract Sum. There shall be separate bonds, the terms of which and the sureties of which are satisfactory to the Owner and which comply with Chapter 2253, Texas Government Code, Title 10 (Vernon Supp. 1999), and all other applicable law. Contractor shall furnish a copy of the Payment Bond to each of its Subcontractors upon request. Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall permit a copy to be furnished.

11.1.2.2 Certificates of insurance acceptable to the Owner, Program Manager and Architect shall be filed with the Owner and Architect prior to commencement of the Work. These certificates and the insurance policies required by this Paragraph 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least thirty (30) days' prior written notice has been given to the Owner. If any of the foregoing insurance coverages are required to remain in force after final payment and are reasonably available, an additional certificate evidencing continuation of such coverage shall be submitted with the final Application for Payment as required by Subparagraph 9.10.2. Information concerning a fifty percent or greater reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both shall be furnished by the Contractor to the Owner, Program Manager and Architect in writing within five (5) business days of Contractor's information and belief.

Contractor's insurance shall apply separately to each insured against whose claim is made or suit is brought, except with respect to the limits of the insurer's liability

11.1.2.3 ~~2~~ The Contractor shall deliver the required bonds to the Owner and Architect not later than five (5) business days after execution of the Contract by Owner. All bonds will be reviewed by the Architect for compliance with the Contract Documents. In the event that the Architect has any questions concerning the sufficiency of the bonds, the bonds will be referred to the Owner or the Owner's representative with Architect's recommendation.

11.1.2.3 4 All bonds shall be originals. The Contractor shall require the attorney-in-fact who executes the required Bonds on behalf of the Surety to affix thereto a certified and current copy of the power-of-attorney. The name, address, and telephone number of a contact person for the bonding company shall be provided.

11.1.2.5 4 Bonds shall guarantee the faithful performance of all of the covenants, stipulations, and agreements of the Contract. Bonds shall be signed by an agent, resident in the State of Texas. If at any time during the continuance of the Contract, the Owner determines that the Contractor is unable to complete the Work in accordance with the Contract Documents, any of the Contractor's bonds become insufficient, the surety becomes insolvent, or the surety's rating drops below the required level, then the Owner shall have the right to require from the Contractor additional and sufficient sureties or other security acceptable to the Owner, which the Contractor shall furnish to the satisfaction of the Owner within ten (10) days after notice to do so. These contractual remedies are in addition to all remedies available by law. In default thereof, all payment or money due to the Contactor may be withheld until the Contractor provides additional surety or security.

11.1.2. ~~.~~5 TEXAS WORKERS' COMPENSATION INSURANCE

A copy of a Certificate of insurance, a certificate of authority to self-insure issued by the commission, or a coverage agreement (TWCC-81, TWCC-83, or TWCC-84), showing statutory worker's compensation insurance coverage for the person's or entity's employees providing services on a project is required for the duration of the Project.

Duration of the Project includes the time from the beginning of the Work on the Project until the Contractor's/person's work on the Project is required for the duration of the Project, including any Warranty Period.

Persons providing services on the Project ("subcontractor") in Texas Labor Code 406.096:
includes all persons or entities performing all or part of the services the Contractor has undertaken to perform on the Project, regardless of whether that person contracted directly with the Contractor and regardless of whether that person has employees. This includes, without limitation, independent contractors, subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity, or employees of any entity that furnished persons to provide services on the Project.

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Services include, without limitation, providing, hauling, or delivering equipment or materials, or providing labor, transportation, or other service related to a project. Services do not include activities unrelated to the Project, such as food/beverage vendors, office supply deliveries, and delivery of portable toilets.

The contractor shall provide coverage, based on proper reporting of classification codes and payroll amount and filing of any coverage agreements, which meets the statutory requirements of Texas Code 401.011 (44) for all employees of the contractor providing services on the project for the duration of the Project.

The Contractor must provide a certificate of coverage to the governmental entity prior to being awarded the contract.

If the coverage period shown on the contactor's current certificate of coverage ends during the duration of the project, the contractor must, prior to the end of the coverage period, file a new certificate of coverage with the governmental entity showing that coverage has been extended. The contractor shall obtain from each person providing services on a project, and provide to the governmental entity:

1. A certificate of coverage, prior to that person beginning work on the project, so the governmental entity will have on file certificates of coverage showing coverage for all persons providing services on the project; and

2. No later than seven (7) days after receipt by the Contractor, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project.

The Contractor shall retain all required certificate of coverage for the duration of the project and for five (5) years thereafter.

The Contractor shall notify the governmental entity in writing by certified mail or personal delivery, within ten (10) days after the contractor knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project.

The Contractor shall post on each project site a notice, in the text, form, and manner prescribed by the Texas Workers' Compensation Commission, informing all persons providing services on the project that they are required to be covered, and stating how a person may verify coverage and report lack of coverage.

The Contractor shall contractually require each person with whom it contracts to provide services on a project, to:

1. Provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code 401.011 (44) for all its employees providing services on the project for the duration of the project.

2. Provide to the contractor, prior to that person beginning work on the project, a certificate of coverage
showing that coverage is being provided for all employees of the person providing services on the project for the duration of the project;

3. Provide the contractor, prior to the end of the coverage period, a new certificate of coverage showing
extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project:

4. Obtain from each other person with whom it contracts, and provide to the contractor:

   a. A certificate of coverage, prior to the other person beginning work on the project; and

   b. A new certificate of coverage showing extension of coverage, prior to the end of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the project:

5. Retain all required certificates of coverage on file for the duration of the project and for five years

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thereafter;

6. Notify the governmental entity in writing by certified mail or personal delivery, within ten (10) days
after the person knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the Project; and

7. Contractually require each person with whom it contracts to perform as required by items 1-6, with the
Certificates of coverage to be provided to the person for whom they are providing services.

By signing this contract or providing or causing to be provided a certificate of coverage, the contractor is representing to the governmental entity that all employees of the contractor who will provide services on the project will be covered by workers' compensation coverage for the duration of the project, that the coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of a self-insured, with the commission's Division of Self-Insurance Regulation. Providing false or misleading information may subject the contractor to administrative penalties, criminal penalties, civil penalties, or other civil actions. The contractor's failure to comply with any of these provisions is a breach of contract by the contractor that entitles the governmental entity to declare the contract void if the contractor does not remedy the breach within ten (10) days after receipt of notice of breach from the governmental entity.

The coverage requirement recited above does not apply to sole proprietors, partners, and corporate officers who are excluded from coverage in an insurance policy or certificate of authority to self-insure that is delivered, issued for delivery, or renewed on or after January 1, 1996.

28 T.A.C. Section 110.110(i).

11.1.2.6 BUILDER'S RISK INSURANCE

Contractor shall obtain, at its expense, a builder's risk "all-risk" or equivalent insurance policy, including boiler and machinery insurance if applicable, In the amount of the initial Contract Sum, or if applicable, Guaranteed Maximum Price, plus value of subsequent Contract modifications and cost of materials supplied or installed by others, comprising total value for the entire Work at the site on a replacement cost basis. Policy shall contain no co-insurance clause. Coverage shall insure against the perils of fire, lightning, wind storm, hurricane, hail, explosion, riot, civil commotion, smoke, aircraft, land vehicles, vandalism, malicious mischief, flood, earthquake, cold testing, collapse, subsidence, sinkhole, damage resulting from faulty workmanship or faulty materials, terrorism for certified and non-certified acts, law and ordinance coverage for renovations, and all other perils, and shall include materials stored on-site, off-site, and in transit. Owner shall be a named insured under the policy, and the insurance shall also include the interests of the Contractor, subcontractors, and sub-contractors. Contractor shall be responsible for maintaining said builder's risk insurance until the date of Substantial Completion

§ 11.1.2.7 ~~.3~~ Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.2.8 ~~.4~~ Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor ~~becomes aware~~knows or should know of an impending or actual cancellation ~~or expiration~~ of any insurance required by the Contract Documents, the Contractor shall provide written notice to the Owner of such impending or actual cancellation ~~or expiration~~. Upon receipt of written notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of written notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage. At least 30 calendar days prior to the date of expiration of any policy required by Section 11.1.1, Contractor shall provide Owner written notice of the impending expiration.

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§ 11.2 Owner's and Architect's Insurance~~Owner's Insurance~~

§ 11.2.1 The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance. The Owner shall be responsible for purchas~~ing~~e and maintaining property and casualty insurance no later than the date of Substantial Completion and such dates of Owner responsibility shall be documented in the Certificate of Substantial Completion. ~~of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The~~If Owner occupies or uses any completed or partially-completed potion of the Work at any stage, then such occupancy or use must be consented to by the insurer and authorized by public authorities having jurisdiction over the Work. To the extent of overlap between Owner's property insurance and Contractor's builder's risk insurance, if any, Contractor's builder's risk shall be primary and non-contributory.~~shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located~~.

§ 11.2.2 ~~Failure to Purchase Required Property Insurance.~~ ~~If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.~~ Partial occupancy or use shall not commence until the insurance company providing this insurance has consented, in writing, by endorsement or otherwise. Owner and Contractor shall take reasonable steps to obtain such consent and shall take no action without written mutual consent that would cause cancellation, lapse, or reduction of this insurance.

§ 11.2.3 Architect shall be responsible for purchasing and maintaining the Architect's liability insurance, worker's compensation insurance, and errors and omissions insurance as provided in the Owner-Architect ~~Agreement~~Contract ~~Notice of Cancellation or Expiration of Owner's Required Property Insurance.~~ ~~Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.~~

§ 11.3 Waivers of Subrogation

§ 11.3.1 ~~The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.~~ All insurance required herein shall contain a waiver of subrogation in favor of Owner, Program Manager

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and Architect on all claims arising out of the Project. The policies shall provide such waivers of subrogation by endorsement or otherwise.

§ 11.3.2 ~~If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.~~ The Owner, as fiduciary, shall have power to adjust and settle any loss arising out of the Work, with insurers regardless of the purchaser of the insurance policy. The Contractor upon receipt of proceeds shall, as a fiduciary, pay all subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements shall require subcontractors to make payment to their sub-subcontractors in similar manner. The Owner shall deposit in a separate account proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor with the insurance proceeds upon issuance of a Notice to Proceed from the Owner.

11.3.3 Partial occupancy or use shall not commence until the insurance company providing this insurance has consented in writing, by endorsement or otherwise. Owner and Contractor shall take reasonable steps to obtain such consent and shall take no action without written mutual consent that would cause cancellation, lapse, or reduction of this insurance.

§ 11.4 Loss of Use~~,~~ and Business Interruption~~, and Delay in Completion~~ Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. ~~The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.~~

~~**11.4.3 WAIVERS OF SUBROGATION**~~

~~The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors, if any, and any of their subcontractors, sub-subcontractors, agents and employees, and (3) Program Manager for damages caused by fire or other perils to the extent covered by property insurance obtained pursuant to this Section 11.4, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The foregoing waiver afforded the Architect, his agents, and employees, shall not extend the liability imposed by Section 3.18.3. The Owner or Contractor, as appropriate, shall require of the Architect, Separate Contractors, Subcontractors, Sub-subcontractors, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated in this Section 11.4.3. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, any separate contractors, subcontractors, sub-subcontractors, agents, and employees of any of them by appropriate agreements, similar waivers each in favor of the other parties enumerated herein.~~

~~11.4.4 The Contractor shall pay all subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements shall require subcontractors to make payment to their sub-subcontractors in similar manner.~~

~~11.4.5 Contractor's builder's risk insurance shall be endorsed to allow partial occupancy (permission to occupy) by Owner. Contractor shall ensure that such partial occupancy will not cause cancellation, lapse, or reduction of this insurance.~~

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the ~~Agreement~~Contract shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of ~~any applicable mortgagee clause and of~~ Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

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§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor and Architect of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor and the Architect shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor and/or the Architect do~~es~~ not object, the Owner shall settle the loss and the Contractor and Architect shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor and/or Architect timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's or Owner's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect or Owner, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect or Owner may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor ~~sh~~may~~ll~~ be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 CORRECTION OF WORK

12.2.1 Before Or After Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, ~~the cost of uncovering and replacement,~~ and compensation for the Architect's and Program Manager's services and expenses made necessary thereby, shall be at the Contractor's expense.

12.2.1.1 The Owner may make emergency repairs to the Work or take such other measures necessary under the circumstances, if the Contractor does not promptly respond to a Notice of Defect or nonconforming Work. Contractor shall be responsible to Owner for this cost if the reason for the repairs is attributable to the Contractor. If payments then or thereafter due to the Contractor are not sufficient to cover such costs, then the Contractor shall pay the difference to the Owner on demand

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof ~~or after the date for commencement of warranties established under Section 9.9.1,~~ or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such written notice promptly after discovery of the condition. ~~During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty.~~ If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of written notice from the Owner or Architect, the Owner may correct the Work as provided in 12.2.2.1.1. Nothing contained in this Section 12.2 is intended to limit or modify any obligations under the law or under the Contract Documents, including any warranty obligations, expressed or implied~~it in accordance with Section 2.5~~.

12.2.2.1.1 If the Contractor fails to perform the corrective Work, then Owner may perform corrective Work, at Contractor's cost. If Owner performs corrective Work, then Owner may also remove nonconforming Work and store

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the salvageable materials or equipment at Contractor's expense. If the Contractor does not pay all costs incurred by Owner within ten (10) days after written notice, then Owner may, upon ten (10) additional days' written notice, sell the removed materials and equipment in accordance with Owner's policies, and shall account for the proceeds thereof, after deducting costs and damages that should have been borne by the Contractor, including compensation for the Architect's services and expenses made necessary thereby. If such proceeds of sale do not cover costs which the Contactor should have borne, then the Contractor shall pay the difference to the Owner.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual performance of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall be extended by corrective Work performed by the Contractor pursuant to this Section 12.2, but only as to the corrected Work. Any corrective work performed or to be performed under or pursuant to Paragraph 12.2 shall be warranted to the same extent as the Work is warranted hereunder for the greater of the remainder of the applicable warranty (corrective) period or ninety (90) days from the date such corrective work has been completed.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction by the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

12.2.4.1 Where nonconforming Work is found, the entire area of Work involved shall be corrected unless the Contractor can completely define the limits to the Architect's satisfaction. Additional testing, sampling, or inspecting needed to define nonconforming work shall be at the Contractor's expense, and performed by the Owner's testing laboratory if such services are reasonably required by the Architect. All corrected work shall be retested at the Contractor's expense. Reasonable Architectural or Program Manager Services required to analyze nonconforming Work shall be paid for by the Contractor.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work. Nothing contained in this Paragraph 12.2 is intended to limit or modify any obligations under the law or under the Contract Documents, including any warranty obligations, expressed or implied.

12.2.6 Contractor shall replace, repair, or restore any parts of the Project or furniture, fixtures, equipment, or other items placed therein (whether by Owner or another party) that are destroyed or damaged by any such parts of the Work that do not conform to the requirements of the Contract Documents or by defects in the Work.

12.2.7 The provisions of this Section 12.2 apply to Work done by Subcontractors of the Contractor as well as Work done directly by employees of the Contractor. The provision for this Section 12.2.7 shall not apply to corrective work attributable solely to the acts or omissions of any separate contractor of Owner (unless Contractor is acting in such capacities). The cost to Contractor for performing any of its obligations under this Section 12.2.7 to the extent not covered by insurance shall be borne by Contractor.

12.2.8 If, however, Owner and Contractor deem it inexpedient to require the correction of Work damaged or not done in accordance with the Contract Documents, then an equitable deduction from the Contract Sum shall be made by written agreement between Contractor and Owner. Until such settlement, Owner may withhold such sums as Owner deems just and reasonable from moneys, if any, due Contractor. The settlement shall not be unreasonably delayed by the Owner and the amount of money withheld shall be based on estimated actual cost of the correction to Owner.

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§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

~~13.1.1 The Contract shall be governed by the laws of the State of Texas, and any litigation shall be conducted in state district court. Mandatory and exclusive venue for any disputes shall be in Dallas , county in place whichere the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.~~ The Contract and any disputes related to the Work shall be governed by the laws of the State of Texas. The Contract is deemed performable entirely in Dallas, Dallas County, Texas. Any litigation to enforce or interpret any terms of the Contract, or any other litigation arising out of or as a result of the Contract or the Work, shall be brought in the State District courts of Dallas County, Texas. In the event of litigation, the substantially prevailing party shall be entitled to its reasonable and necessary attorney's fees that are equitable and just.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to the other party hereto and to partners, successors, assigns, and legal representatives of such other party in respect to covenants, agreements, and obligations contained in the Contract Documents. ~~Except as provided in Section 13.2.2, Nneither party to the Contract shall assign the Contract, as ain whole or in part, without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.~~ The Contractor shall not assign the Contract as a whole, or in part, without written consent of the Owner.

§ 13.2.2 The invalidity of any part or provision of the ~~Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the~~ Contract Documents shall not impair or affect in any manner whatsoever the validity, enforceability, or effect of the remainder of the Contract Documents. The Owner may, without consent of the Contractor, assign the Contract in whole or in part. In such event, the assignee shall assume the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignments. ~~The Contractor shall execute all consents reasonably required to facilitate the assignment.~~

§ 13.3 Rights and Remedies

§ 13.3.1 Written notice shall be deemed to have been duly served only if the writing is delivered in person to the office of the party set out ~~O~~on the first page of the Standard Form of ~~Agreement~~Contract Between Owner and Contractor, or to such other address as has been previously clearly identified in writing by the addressee, or sent by registered or certified mail to that address. Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner~~,~~ or Architect~~, or Contractor~~ shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing. The application of a time-is-of-the-essence clause as to any action or duty required of Contractor by the Contract Documents shall not be waived by course of performance or course of dealing by Contractor.

13.3.3 ~~4~~ Neither Contractor nor any of its materialmen, laborers or Subcontractors shall have any lien rights against the Owner's lands, building funds, materials or other property. No materialmen, laborers or Subcontractors of the Contractor shall have any enforceable rights against the Owner on this Contract. Materialmen, laborers and Subcontractors of the Contractor may have rights under any Payment Bond provided by the Contractor, but cannot look to the Owner for any help in enforcement of those rights.

13.3.4 The invalidity of any part or provision of the Contract Documents shall not impair or affect in any manner whatsoever the validity, enforceability or effect of the remainder of the Contract Documents.

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§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made at appropriate times as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities having jurisdiction. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity employed by the Owner for this purpose ~~acceptable to the Owner,~~ or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals which shall be included in the Cost of the Work. Provided, however, per Texas Government Code Chapter 2269, Owner shall bear all costs of construction materials, engineering, testing, and inspection services, and the verification testing services necessary for acceptance of the facility by the Owner. Owner shall bear the normal costs of these services, but not any excess costs attributable to Contractor caused scheduling problems, other Contractor error or retesting. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may observe be present for such procedures. ~~The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded.~~ The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Owner shall provide or contract ~~the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements~~ for such additional testing, inspection, or approval~~, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures.~~ Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense. Architect, Owner, and Contractor shall cooperate for the timely scheduling of such tests and inspections.

§ 13.4.3 If such procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including, but not limited to, those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect, with a copy to the Owner.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Undisputed ~~P~~payments due and unpaid under the Contract Documents shall bear interest from the date payment is overdue at the rate provided by Texas Government Code Section 2251.025~~the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.~~ Any such payment shall be deemed overdue on the thirty-first (31st) day after Owner received Architect's invoice or Contractor's completed Application for Payment for the Architect, whichever is later, if Owner's Board of Trustees meet more than once per month. Any such payment shall be deemed overdue on the forty-sixth (46th) day after Owner receives Architect's invoice or Contractor's Certificate for Payment from the Architect, if Owner's Board of Trustees meet once a month or less frequently. No interest shall be due on sums properly retained by Owner, except ~~expect~~ as provided by law, or on disputed sums unpaid by Owner.

13.6 EQUAL OPPORTUNITY IN EMPLOYMENT

13.6.1 The Contractor and the Contractor's Subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, age, disability, sex, national origin, or any class otherwise protected by District policy or law. The Contractor agrees to post in conspicuous places, available to employees and applicants, notices setting forth the Contractor's nondiscrimination policies.

13.6.2 The Contractor and the Contractor's Subcontractors shall, in all solicitations or advertisements for employees placed by them or on their behalf, state that all qualified applicants will receive consideration for employment

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without regard to race, religion, age, disability, sex, national origin, or any class otherwise protected by District policy or law.

13.7 RECORDS

13.7.1 Contractor shall at all times through the date of Final Completion, maintain Job Records, including, but not limited to, invoices, Construction Documents, payment records, payroll records, daily reports, diaries, logs, instructions, drawings, receipts, subcontracts, purchase orders, vouchers, memoranda, other financial data and job meeting minutes applicable to the Project, in a manner which maintains the integrity of the documents. Job Records must be retained by Contractor for a least twelve (12) years, after the date of Final Completion of the Project. Within five (5) days of Owner's request, Contractor shall make such Job Records available for inspection, copying, and auditing by the Owner, Architect, or other respective representatives, at Owner's central office.

13.7.2 If Contractor is a Construction Manager at Risk, then Contractor shall also maintain, in accordance with the provisions of Section 13.7.1, the following: subcontract files, including proposals of successful and unsuccessful bidders, bid recaps, and subcontractor payments; original estimates; estimating work sheets; general ledger entries detailing cash and trade discounts received; insurance rebates and dividends; and any other supporting evidence deemed necessary by the Owner to substantiate charges related to the Contract.

13.7.3 Contractor shall keep a full and detailed financial accounting system and shall exercise such controls as may be necessary for property financial management under this Contract; the accounting and control systems shall be satisfactory to the Owner and shall be subject to the provisions of Section 13.7.1.

13.7.4 Contractor shall keep all Contract Documents related to the Project, subject to the provisions of Section 13.7.1, provided, however, Contractor shall not destroy said documents until Contractor has confirmed with Owner in writing, that Owner has obtained a copy of all as-built drawings.

13.7.5 In the event that an audit by the Owner reveals any errors/overpayments by the Owner, then the Contractor shall refund to the Owner the full amount of such overpayments within thirty (30) days of such audit findings, or the Owner, at its option, reserves the right to deduct such amounts owed to the Owner from any payments due to the Contractor.

13.7.6 Commencement of Statutory Limitation Period, As between the Owner and Contractor; after Final Certificate for Payment.

13.7.7 At any time during the term of this ~~Agreement~~Contract and for a period of ten ~~four~~ (~~4~~10) years thereafter, the Owner or a duly authorized audit representative of the Owner, or the State of Texas, at its expense and at reasonable times, reserves the right to audit the Contractor's records and books relevant to all services provided under this ~~Agreement~~Contract. In the event such an audit by the Owner reveals any errors/overpayments by the Owner, the Contractor shall refund the Owner the full amount of such overpayments within thirty (30) day of such audit findings, or the Owner, at its option, reserves the right to deduct such amounts owing the Owner from any payments due the Contractor.

13.8 NONDISCRIMINATORY EMPLOYMENT

13.8.1 In connection with the execution of this Contract, the Contractor shall fully comply with the District non-discrimination requirement cited below.

"The Dallas Independent School District, as an equal opportunity educational provider and employer, does not discriminate on the basis of race, color, religion, sex, national origin, disability, sexual orientation and/or age in educational programs or activities that it operates or in employment decisions. The District is required by Title VI and Title VII of the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, Section 504 of the Rehabilitation Act of 1973, the Americans with Disabilities Act, and the Age Discrimination Act of 1975, as amended, as well as board policy not to discriminate in such a manner. (Not all prohibited bases apply to all programs.)"

During the performance of this Contract, the Contractor further agrees as follows:

.1 The Contractor will not discriminate against any employee or applicant for employment because of race, color, sex, religion, national origin or age;

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.2 The Contractor will take affirmative action to ensure that applicants are employed and that employees are treated during employment without regard to their race, color, sex, religion, national origin or age. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the requirements of these non-discrimination provisions.

Submittal to Owner of reasonable evidence of discrimination will be grounds for termination of the ~~Agreement~~Contract.
This policy does not require the employment of unqualified persons.

13.9 CERTIFICATION OF NONSEGREGATED FACILITY

13.9.1 This Subparagraph is applicable to Contracts and Subcontracts exceeding $10,000.00 which are not exempt from the provisions of the Equal Opportunity Clause.

13.9.2 By the signing of this Contract, the Contractor signifies that it does not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. It certifies further that it will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it will not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. The undersigned agrees that a breach of this certification is a violation of the Equal Opportunity Clause in this proposed Contract. As used in this certification, the term 'segregated facilities' means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated on the basis of race, creed, color, or national origin, because of habit, local custom, or otherwise. It further agrees that (except where it obtained identical certifications from proposed consultants for specific time period), it will obtain identical certification from proposed Subcontractors prior to the award of a Contract exceeding $10,000.00 which are not exempt from the provisions of the Equal Opportunity Clause; that it will retain such certifications in its files; and that it will forward the following notice to such proposed Subcontractors (except where the proposed Subcontractors have submitted identical certifications for specific time periods): Notice to Prospective Subcontractors of requirement for certification of non-segregated facilities, as required by the May 19, 1967 Order (32 FR.7439, May 19, 1967) on elimination of segregated facilities, by the Secretary of Labor, must be submitted prior to the award of a Contract exceeding $10,000.00 which is not exempt from the provisions of the Equal Opportunity Clause. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually, or annually).

Note: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.11.

13.10 PREVAILING WAGE RATES

13.10.1 In compliance with laws of the State of Texas relating to labor Texas Government Code Section 2258.001 *et seq.* the building construction wage rates listed in the Contract Documents have been ascertained and determined by the Owner as the general prevailing rates in the locality of Dallas Independent School District for the classifications listed. The Contractor and each Subcontractor shall pay to all laborers, workers and mechanics employed by them in the execution of this Contract not less than such rates for each craft or type of worker or mechanic needed to execute the Contract. If it becomes necessary to employ any person in a trade or occupation not herein listed, such person shall be paid not less than an hourly rate fairly comparable to the rates shown hereinafter.

13.10.2 This determination of prevailing wages shall not be construed to prohibit the payment of more than the rates named.

13.10.3 In compliance with the above cited law the Contractor shall forfeit, as a penalty to the Owner, Sixty Dollars ($60.00) for each laborer, worker or mechanic employed, for each calendar day, or portion thereof, such laborer, worker or mechanic is paid less than the rates stipulated hereinafter for any work done under this Contract by him or any Subcontractor under him.

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13.10.4 Owner reserves the right to receive and review payroll records, payment records, and earning statements of employees of Contractor, and of Contractor's Subcontractors and Sub-subcontractors.

13.10.5 In executing the Work under the Contract Documents, Contractor shall comply with all applicable state and federal laws, including but not limited to, laws concerned with labor, equal employment opportunity, safety and minimum wages.

13.11 CERTIFICATION OF ASBESTOS-FREE PROJECT

13.11.1 Contractor shall submit to the Architect a letter addressed to the Owner certifying that all materials used in the construction shall be asbestos free. The General Contractor shall provide certification for himself, all subcontractors, vendors, suppliers, and other entities, stating that materials and/or equipment used in the construction of the project do not contain asbestos in any form or concentration. Certification letters shall be dated, shall reference this specific Project, and shall be signed by not less than two officers of the construction company.

13.11.2 Final Payment shall not be made until this letter of certification has been received.

13.12 CERTIFICATION OF LEAD-FREE POTABLE WATER SYSTEM

13.12.1 Contractor shall submit to the Architect a letter, addressed to the Owner, stating that any components of the potable water system installed by the Contractor are lead-free as defined by the Safe Drinking Water Act Amendment of 1986 and the Lead Contamination Control Act of 1988.

13.13 Responsibility For Contractor's Forces. The Contractor shall be responsible for the actions of Contractor's forces, and Subcontractor's forces to enforce the Owner's drug-free, alcohol-free, and tobacco-free zone. Contractor agrees to abide by Owner's policies prohibiting the use of tobacco, alcohol or illegal drugs in any form on any property owned, operated, or maintained by the Owner. Contractor agrees to require all subcontractors and sub-subcontractors to abide by these policies,. Violation of this provision shall constitute a material breach of this agreement.

13.14 FAMILY CODE CHILD SUPPORT CERTIFICATION

By signing this ~~Agreement~~Contract, the Contractor certifies as follows: "Under Section 321.006, Texas Family Code, the vendor or applicant certifies that the individual or business entity named in this contract, bid, or application is not ineligible to receive the specified grant, loan, or payment and acknowledges that this contract may be terminated and payment may be withheld if this certification is inaccurate.

13.15 NON-COMPENSATION REQUIREMENT

The Owner may not accept a bid or award a contract that includes proposed financial participation by a person who received compensation from the Owner to participate in preparing the specifications or request for proposals on which the bid or contract is based. The Contractor is described as vendor in the statutory quote below:

"Under Section 2155.004, Government Code, the vendor certifies that the individual or business entity named in this bid or contract is not ineligible to receive the specified contract and acknowledges that this contract may be terminated and payment withheld if this certification is inaccurate."

13.16 ~~8~~ PROPRIETARY INTERESTS AND CONFIDENTIAL INFORMATION

13.16.1 ~~8~~ Neither Architect nor Contractor shall use the image or likeness of Owner's Project or Owner's official logo or emblem and any other trademark, service mark, or copyrighted or otherwise protected information of Owner, without Owner's prior written consent. Contractor and Architect shall not have any authority to advertise or claim that Owner endorses Architect or Contractor's services, without Owner's prior written consent.

13.16.2 Neither Architect nor Contractor shall disclose any confidential information of Owner which comes into the possession of Architect or Contractor at any time during the Project, including but not limited to: pending real estate purchases, exchange, lease, or value; information related to litigation; the location and employment of security devices, security access codes; student likenesses; student record information; employee information; or any other information deemed confidential by law.

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13.16.3 The parties acknowledge that, as a public entity in the State of Texas, Owner is subject to, and must comply with, the provisions of the Texas Public Information Act, Texas Government Code Section 552.001, *et seq.*, and the Texas Open Meetings Act, Texas Government Code, Section 551.001. *et seq.*

13.16.4 All information owned, possessed, or used by Owner which is communicated to, learned, developed or otherwise acquired by Contractor in the performance of services for Owner, which is not generally known to the public, shall be confidential and Contractor shall not, beginning on the date of first association or communication between Owner and Contractor and continuing through the term of this ~~Agreement~~Contract and at any time thereafter, disclose, communicate or divulge, or permit disclosure, communication or divulgence, to another or use for Contractor's own benefit or the benefit of another, any such confidential information, unless required by law. Except when defined as part of the Project, Contractor shall not make any press releases, public statements, or advertisement referring to the Project or the engagement of Contractor as an independent contractor of Owner in connection with the Project, or release any information relative to the Project for publications, advertisement or any other purpose without prior written approval of Owner. Contractor shall obtain assurances similar to those contained in this Subparagraph from persons, agents, and subcontractors retained by Contractor. Contractor acknowledges and agrees that a breach by Contractor of the provisions hereof will cause Owner irreparable injury and damage. Contractor, therefore, expressly agrees that Owner shall be entitled to injunctive and/or other equitable relief to prevent or otherwise restrain a breach of this ~~Agreement~~Contract.

.1 Contractor acknowledges and agrees that the Owner has an interest in maintaining and otherwise protecting the image and reputation of the Owner's official logo or emblem and any other trademarks, copyrighted or otherwise protected materials of the Owner (hereinafter referred to as the "Owner's Protected Materials"), and that in order to accomplish this purpose, the Owner must in all cases assure itself that the Owner's Protected Materials are at all times used in a manner consistent with the Owner's policies, administrative regulations, and this ~~Agreement~~Contract.

.2 Contractor agrees that the Owner must, therefore, have the right to examine and approve or disapprove such use in writing in advance of use, the contents, appearance and presentation of any and all advertising, promotional or other similar materials proposed by the Contractor to be used in connection with any advertising or promotion utilizing Owner's Protected Materials.

13.17 ~~8~~ The Contractor shall ~~have~~ bear full responsibility for utilizing means and methods that may result in an overstress of any structure or any part or member of it during construction. The Contractor shall fully check the effect of his
operations in this regard, and shall provide all temporary support and connections required.

13.18 ~~9~~ The Contractor shall protect and be responsible for any damage to or loss of its (his/her) work, tools, equipment, or material, from the date of the Contract until the acceptance of the Work and shall make good without cost to the Owner, any damage or loss that may occur during this period. All material affected by weather shall be covered and protected to keep it from damage while being transported to the site, as well as when it is stored on the site. The Contractor at its (his/her) own expense and option shall employ watchmen or erect fencing at such time as necessary to protect his work, tools, equipment or material by the Contractor and the fact that the Owner has a watchman, if any, shall not mean that the Owner has undertaken, nor does the Owner undertake, to protect work, tools, equipment and materials from theft or mysterious disappearance.

13.19 The Contractor should only take direction on any issues regarding the Project when provided by the Owner's Office of Construction Services or the Program Manager or Architect.

13.20 The Contractor and subcontractor shall ensure that on-site fraternization shall not occur between personnel under the Contractor's or subcontractor's direct or indirect supervision and students, school employees and the general public.

13.21 PARTNERING
Contractor will participate in a partnering process if requested by Owner.

13.22 AS-BUILT DRAWINGS
Prior to issuance of the Certificate of Final Completion by Architect and Program Manager, the Contractor shall submit to Architect a complete set of as-built drawings, with all changes made during construction, including

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concealed mechanical, electrical and plumbing items clearly shown. The Contractor shall submit these drawings in a medium acceptable to the Architect. Based upon the as-built drawings received from Contractor, Architect shall, within thirty days after receipt of the as-built drawings from Contractor, complete Record Drawings.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of ninety ~~3~~90 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, under direct or indirect contract with the Contractor, for any of the following reasons, which are the sole grounds for termination under this Subparagraph 14.1.1.~~:~~;

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped; or

.3 ~~Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the~~ Owner has not made payment of undisputed sums due on an approved Certificate for Payment within the time stated in the Contract Documents. ~~; or~~

~~.4 The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.~~

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, under direct or indirect contract with the Contractor, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 ~~If one of the reasons described in Section 14.1.1 or 14.1.2 exists, then, after the applicable time period, the Contractor may, upon seven (10) days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, and for proven unrecoverable loss with respect to materials, equipment, tools, and construction equipment and machinery incurred to the date of termination as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination~~If the Work is stopped for ninety (90) consecutive days for any reason described in Subparagraphs 14.1.1 or 14.1.2, the Contractor may, upon fourteen (14) days written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, and for proven loss with respect to materials, equipment, tools, and construction equipment and machinery, including reasonable overhead, profit and damages to date of termination.

14.1.4 If the Work is stopped for a period of ninety (~~6~~90) consecutive days through no act or fault of the Contractor, or a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has ~~repeatedly~~ persistently failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon ~~twenty~~ fourteen (~~20~~14) additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

14.1.5 Notwithstanding anything to the contrary contained herein or in the other Contract Documents, neither the Owner or any other party shall be responsible for damages for loss of anticipated profits on Work not performed on account of any termination described in Subparagraphs 14.1.1, 14.1.2 and 14.1.3.

14.2 Termination by the Owner for Cause

14.2.1 The Owner may terminate the Contract if the Contractor

.1 persistently or repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

.2 fails to make payment to Subcontractors or ~~s~~Suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or ~~s~~Suppliers;

.3 ~~repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or~~ persistently disregards laws, ordinances, or rules, regulations or orders of a public authority having jurisdiction; or

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.4 otherwise is guilty of ~~substantial breach of a provision of~~ a material breach of provision of the Contract Documents;

.5 fails to furnish the Owner, upon written request, with assurances satisfactory to the Owner, evidencing the Contractor's ability to complete the Work in compliance with all the requirements of the Contract Documents; ~~or~~

.6 engages in serious or repeated worker misconduct in violation of Article 3.3.2;

.7 engages in conduct that would constitute a violation of state or federal criminal law, including but not limited to, the laws prohibiting certain gifts to public servants, or engages in conduct that would constitute a violation of the Owner's ethics or conflict of interest policies; or

.8 fails to proceed continuously and diligently with the construction and completion of the Work, except as permitted under the Contact Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, subject to any prior rights of the surety, ~~and upon certification by the Architect that sufficient cause exists to justify such action,~~ the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 ~~Exclude the Contractor from the site and t~~Take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished. Any further payment shall be limited to amounts earned to the date of Contractor's removal.

§ 14.2.4 If the ~~unpaid balance of the Contract Sum exceeds~~ costs of finishing the Work, including compensation for the Architect's and Program Manager's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, exceed the unpaid balance of the Contract Sum or Guaranteed Maximum Price (if the Project is a Construction Manager at Risk project), ~~such excess shall be paid to~~ then the Contractor and/or its Surety shall pay the difference to the Owner. ~~If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner.~~ The amount to be paid to the ~~Contractor or~~ Owner, ~~as the case may be,~~ shall be certified by the Architect ~~the Initial Decision Maker~~, upon application, and this obligation for payment shall survive termination of the Contract.

14.2.5 The parties hereby agree that: 1) if an order for relief is entered on behalf of the Contractor, pursuant to Chapter 11 of the U.S. Bankruptcy Code; 2) if any other similar order is entered under any debtor relief laws; 3) if Contractor makes assignments for the benefit of one or more of its creditors; 4) if a receiver is appointed for the benefit of its creditors; or 5) if a receiver is appointed on account of its insolvency, any such event could impair or frustrate Contractor's performance of the Contract Documents. Accordingly, it is agreed that upon occurrence of any such event, Owner shall be entitled to request of Contractor or its successor in interest, adequate assurance of future performance in accordance with the terms and conditions of the Contract Documents. Failure to comply with such request within ten (10) days of delivery of the request shall entitle Owner to terminate the Contract and to the accompanying rights set forth in Subparagraphs 14.2.1 through 14.2.6. In all events, pending receipt of adequate assurance of performance and actual performance in accordance with the Contract Documents, Owner shall be entitled to proceed with the Work with Owner's own forces or with other Contractors on a time and material or other appropriate basis, the cost of which will be charged against the Contract Sum.

If a Performance Bond has been furnished and the Contractor is declared by the Owner to be in default under the Contract, the Surety shall promptly remedy the default by completing the Contract in accordance with its terms and conditions, or by obtaining a bid or bids in accordance with its terms and conditions. At Owner's election, upon determination by the Owner and the Surety of the lowest responsible bidder, the Surety will complete the Work or will arrange for a Contract between such bidder and the Owner, and make available as Work progresses sufficient funds to pay the cost of completion less the balance of the Contract Sum, but not exceeding the Penal Sum of the bond and other costs and damages for which the Surety may be liable under the bond. The phrase 'balance of the Contract Sum' as used herein shall mean the total amount payable by the Owner to the Contractor under the Contract and amendments thereto less the amount previously paid by the Owner to the Contractor.

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14.2.6 As required by Texas Government Code Chapter 2253, if a Performance Bond has been furnished and the Contractor is declared by the Owner to be in default under the Contract, then the Surety shall promptly perform the Work, in full accordance with the plans, specifications, and Contract Documents. Unless otherwise agreed in writing between the Surety and the Owner, the Surety shall complete the Work by the Surety entering into a Contract acceptable to Owner, with a Contractor acceptable to Owners, and shall obtain new Payment and Performance Bonds as required by law.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 ~~The Contract Sum, Guaranteed Maximum Price, and Contract Time shmayll be adjusted, by mutual written agreement, for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit~~. An adjustment shall be made to the Contract Sum calculated under Article 7. No adjustment shall be made to the extent

.1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause. Furthermore, if this Contract is a multi-year contract funded through Owner's current general funds that are not bond funds, then the Owner's Board of Trustees has the right to not appropriate adequate monies for the next fiscal year and to terminate this Contract at the end of each fiscal year during the term of the Contract, without the Owner incurring any further liability to Contractor as a result of such termination.

§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; and for proven unrecoverable loss with respect to materials, equipment, tools, and construction equipment and machinery incurred to the date ~~costs incurred by reason~~ of ~~the~~ termination~~, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement~~. Such payment shall not cause the Contract Sum, or Guaranteed Maximum Price, if the Project is a Construction Manager at Risk Project, to be exceeded. Such payment shall not include overhead and profit for Work not executed.

14.4.4 Upon determination by a Court of competent jurisdiction that termination of the Contractor pursuant to Section 14.2 was wrongful, such termination will be deemed converted to a termination for convenience pursuant to Section 14.4, and Contractor's remedy for wrongful termination shall be limited to the recovery of the payments permitted for termination for convenience as set forth in Section 14.4.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is ~~any demand or assertion by one of the Contractor parties seeking, as a matter of right, payment of additional compensation under the Contract Documentsmoney, interpretation of the Contract Document terms, a change in the Contract Time;, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the partyContractor making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.~~ any demand or assertion by the Contractor that it should be paid more money than the

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Contract Sum or granted more contract time by the Owner because of action or inaction on the part of Owner, any Owner representative, Architect, or any party for whom Owner is responsible, or any party with whom Owner has separately contracted for other portions of the Project, including, but not limited to, any demand or assertion that Contractor's performance has been delayed, interrupted or interfered with, that Contractor's performance has been accelerated, constructively accelerated, or suspended, that Contractor's performance has been wrongfully terminated, that there has been a failure of payment, that Contractor has encountered concealed or unknown conditions, that Contractor has encountered hazardous materials, that actions or omissions of the Owner have been wrongful related in any way to the Work, that a time extension grant was inadequate, that there has been a breach of contract, or that Contractor is entitled to any other relief, on any legal or equitable theory, related to the Work or the Contract. This definition of Claim is not intended to create any right of action where the right of action does not otherwise exist under applicable law or other provisions of this Contract.

§ 15.1.2 Notice Requirement ~~Time Limits on Litigation~~Claims

~~The Owner and Contractor shall commence all Claims~~litigation and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in anythe case of the Owner, not more than 120 years after the date of Final~~Substantial~~ Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2. Within fourteen (14) calendar days of the first occurrence of an event that Contractor has any reason to believe might result in a Claim, or within fourteen (14) calendar days of Contractor's discovery of the first occurrence of an event that Contractor has any reason to believe might result in a Claim if the first occurrence of the event was willfully hidden from the Contractor, the Contractor shall file a written document clearly captioned "Notice of Claim" with Owner, Program Manager and the Architect. The Notice shall clearly set out the specific matter of complaint, and the impact or damages, which may occur or have occurred as a result thereof, to the extent the impact or damages can be assessed at the time of the Notice. If the impact or damages cannot be assessed as of the date of the Notice, the Notice shall be amended at the earliest date that is reasonably possible. It is imperative that Owner have timely, specific Notice of a potential problem in order that the problem can be mitigated promptly.

15.1.2.1 In addition to the Notice required by Subparagraph 15.1.2, the Contractor shall also file a document captioned "Claim" with the Owner, Program Manager and Architect within ninety-one (91), days of occurrence of any event resulting in a Claim for damages, giving notice of the Claim. Contractor agrees that this is a reasonable Notice requirement. Any Claim or portion of a Claim that has not been made the specific subject of a Notice strictly in accordance with the requirements of this section is waived.

§ 15.1.3 ~~Notice of Claims~~ Continuing Contract Performance

After receipt of a Notice of Claim, the Architect shall have fourteen (14) calendar days to render a decision, which shall be stated in writing and delivered to the Contractor, the Owner and the Program Manager via facsimile, regular mail or hand delivery. If the Architect fails to render a decision in writing with the fourteen (14) days, the Claim shall be deemed accepted. Within five (5) calendar days of receipt of the Architect's written decision, Contractor may file a written appeal of the decision to the Program Manager. The Program Manager shall have ten (10) calendar days to render a decision, which shall be stated in writing and delivered to the Contractor, Architect and the Owner via facsimile, regular mail or hand delivery. If the Program Manager fails to render a decision in writing within the ten (10) days, the claim shall be deemed accepted. Within five (5) calendar days of receipt of the Program Manager's written decision, Contractor may file a written appeal of the decision with the Deputy Superintendent of Business Services. Within fourteen (14) calendar days of the receipt of an appeal, an Appeals Board consisting of the Deputy Superintendent of Business Services, Chief Operations Officer, and a representative of the offices of Legal Services shall render a written decision. Any Claim determination requiring a Change Order must be approved by the Board of Trustees. The filing, or rejection of a Claim does not entitle Contractor to stop performance of the Work. The Contractor shall proceed diligently with performance of the Contract during the pendency of any Claim, excepting termination or under Owner's direction to stop the Work. Any Claim that would require expenditure in excess of $10,000.00, or that would require a Change Order, must be reviewed by the Program Manager and the Appeals Board using the appeals process described in this section.

15.1.3.1 Claims by ~~either~~ the ~~Owner or~~ Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by written notice to the ~~other party~~Owner and to the ~~Initial Decision Maker with a copy sent to the~~ Architect~~, if the Architect is not serving as the Initial Decision Maker~~. Claims by Contractor~~either party~~ under this Section 15.1.3.1 ~~shall~~must be

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initiated within 21 calendar days after occurrence of the event giving rise to such Claim or within 21 calendar days after the ~~e~~Contractor~~laimant~~ first knew or should have known~~recognizes~~ the condition giving rise to the Claim, whichever is ~~lat~~earlier. Claims must be initiated by written notice titled: "Notice of Claim" ("Notice") and sent to the Architect and Owner's designated representatives. The Notice shall clearly set out the specific matter of complaint, and the impact which may occur or have occurred as result thereof, to the extent that the impact can be assessed at the time of the Notice. If the impact cannot be assessed as of the date of the Notice, then the Notice shall be amended at the earliest date that is reasonably possible. It is imperative that Owner receive timely specific Notice of any potential problem identified by Contractor in order that the problem can be mitigated or resolved promptly. Claims not filed as required by this Section shall be waived.

§ 15.1.3.2 Claims by ~~either~~ the ~~Owner or~~ Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by written notice to the other party. In such event, no decision by the Initial Decision Maker is required.

15.1.3.3 When Owner has an applicable claim for construction defects, Owner shall comply with the provisions of Texas Government Code Chapter 2272 related to the provision of notice of defects and the Contractor's or Architect's opportunity to cure.

§ 15.1.4 ~~Continuing Contract Performance~~ Claims Handling Following Construction

The acceptance of final payment shall constitute a waiver of Claims by the Contractor, which have not previously been identified in a Notice of Claim under 15.1.2 and a Claim under 15.1.2.1 and specifically reserved in the final Application for Payment.

§ 15.1.4.1 Time Limits on Litigation. The Owner and Contractor shall commence all litigation whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the dispute resolution method selected in the Contract and within the period specified by applicable law, but in the case of the Owner, not more than eight (8) years after the date of Final ~~Substantial~~ Completion of the Work, unless extended in accordance with Texas Civil Practice and Remedies Code Section 16.009. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

15.1.4.2 Pre-Litigation Mediation

~~.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7, as amended, and Article 14, as amended, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make undisputed payments for Work performed in accordance with the Contract Documents.~~ Except as to claims for injunctive relief, neither party may commence litigation relating to any Claim arising under this ~~Agreement~~Contract without first submitting the Claim to Mediation. The parties shall share the mediator's fee and any filing fees equally, and the mediation shall be held in Dallas, Texas. ~~Agreement~~Contracts reached in mediation must be approved by the Board of Trustees and shall thereafter be enforceable as settlement agreements in any court having jurisdiction thereof. Mediation shall be conducted by a mediator selected jointly by the Owner and Contractor.

15.1.4.3 ~~The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.~~

§ 15.1.5 Claims For Concealed Or Unknown Conditions. Only if conditions are encountered at the site which are (a) subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents, (b) unknown physical conditions of an unusual nature, which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents or (c) in the case of renovation Work, any condition of the pre-existing construction to be renovated, that is materially different from any of the conditions that could reasonably have been expected to be present in preexisting construction of the age and type encountered on the Project, then Contractor shall be entitled to make a Claim if it can satisfy all of the requirements of Paragraph 15.1.

15.1.5.1 No adjustment in the Contract Time or Contract Sum shall be permitted, however, in connection with a concealed or unknown condition which does not differ materially from those conditions disclosed or which reasonably should have been disclosed by Contractor's (1) prior inspections, tests, reviews and preconstruction services for the Project, or (2) inspections, tests, review and preconstruction services which were given to Contractor

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by Owner, Architect or Owner's representative or which Contractor had the opportunity to make or should have performed in connection with the Project.

15.1.6 Calculating Claim Amount

In calculating the amount of any Claim, the following standards will apply:

.1 No indirect or consequential damages will be allowed;

.2 No recovery shall be based on a comparison of planned expenditures to total actual expenditures, or on; Estimated losses of labor efficiency, or on a comparison of planned man loading to actual man loading, or any other analysis that is used to show damages indirectly;

.3 Damages are limited to extra costs specifically shown to have been directly caused by a proven wrong;

.4 The maximum daily limit on any recovery for delay shall be the amount originally estimated by the Contractor for job overhead costs divided by the total number of calendar days of Contract Time called for in the original Contract;

.5 No damages will be allowed for home office overhead or other home office charges, or any Eichlay formula calculation; and

.6 No profit will be allowed on any Claim.

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of ~~cost and of~~ probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and prevented the execution of major items of work on normal working days ~~had an adverse effect on the scheduled construction~~.

15.1.6.3 4 Time extensions may be granted for rain days in any month when the cumulative number of rain days during that month exceeds the number scheduled, provided that the rainfall prevented the execution of major items of work on normal working days. No day will be counted as a rain day when substantial Contractor forces are able to perform Work on the Project for more than fifty percent (50%) of the usual workday or when the stage of the Work on the Project is not adversely impacted. The number of rain days shown in the above schedule for the first and last months of the Contract will be prorated in determining the total number of rain days expected during the period of the Contract. No delays or extensions shall be granted for mud conditions.

15.1.6.4 ~~5~~ No extension of time shall be made to the Contractor because of hindrances or delays from any cause which is the fault of Contractor or Contractor's Subcontractors or under Contractor's control. Claims for extension of time may only be considered because of rain delays, or because of hindrances or delays which are the fault of Owner and/or under Owner's control, but only to the extent that Substantial Completion of the Project is adjusted beyond the original Substantial Completion date. Only claims for extension of time shall be considered because of hindrances or delays not the fault of either Contractor or Owner, but only to the extent that Substantial Completion of the Project exceeds the Substantial Completion date established for the Work. Board approval shall be required for any extension of time. No damages shall be paid for delays. Contractor shall only be entitled to time extensions per the terms of the Contract Documents.

15.1.6.5 6 Requests for time extension shall be submitted on a monthly basis and shall specify the time delay, the cause of the delay, and the responsible party for the delay, whether Contractor, Owner, rain day, or other. No claims for damages for delay shall be made by Contractor. Any claim not submitted under the terms of this Section shall be waived.

§ 15.1.7 Waiver of Claims for Consequential Damages

~~The Contractor and Owner waives all Claims against Ownereach other for consequential damages arising out of or relating to this Contract, including, but not limited to, any amount owed as compensation for the increased cost to perform the Work as a direct result of Owner-caused delays or acceleration. This mutual waiver includes~~

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.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

15.1.8 Injury Or Damage To Person Or Property

If either party to the Contract suffers injury or damage to persons or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party as provided herein. The Notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 15.2 ~~Initial Decision~~ Resolution of Claims and Disputes

§ 15.2.1 ~~Claims by the Contractor against the Owner, including~~excluding those alleging an error or omission by the Architect, ~~where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initially Decision Maker for initial decision. to tThe Architect for written recommendationwill serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If An initial recommendation by the Architect shall be required as a condition precedent to mediation or litigation of all Claims by the Contractor arising prior to the date final payment is due, unless decision has not been rendered within 30 days have passed after the Claim has been referred to the Architect with no recommendation having been rendered by the Architectafter the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.~~

§ 15.2.2 ~~The Architect shall Initial Decision Maker will review Claims and within ten (10) days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the Contractorclaimant or a response with supporting data from the other party, or (2) make a written recommendation to the Owner, with a copy to the Contractor. reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.~~

§ 15.2.3 ~~In evaluating Claims, the ArchitectInitial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the ArchitectInitial Decision Maker in making a written recommendationrendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.~~

§ 15.2.4 ~~Owner, Architect, or their respective agents, within five (5) working days of request by Owner, Architect, or their respective agents. Job records must be retained by Contractor and all subcontractors for a least twelve (12) years after the date of Final Completion of the Project. If the ArchitectInitial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the ArchitectInitial Decision Maker 1when the response or supporting data will be furnished, or (3) advise the ArchitectInitial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.~~

§ 15.2.5 ~~The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision~~

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~~Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution~~ Following receipt of the Architect's written recommendation regarding a Claim, the Owner and Contractor shall attempt to reach agreement as to any adjustments to the Contract Sum or Guaranteed Maximum Price and/or Contract Time. If no agreement can be reached, then either party may request mediation of the dispute pursuant to Section 15.3.

§ 15.2.6 Upon receipt of a Claim against the Contractor or at any time thereafter, the Architect or the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Architect or the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy ~~Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.~~

§ 15.2.6.1 ~~Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.~~

§ 15.2.7 ~~In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.~~

§ 15.2.8 ~~If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.~~

§ 15.3 ~~Mediation~~Alternative Dispute Resolution

§ 15.3.1 ~~Claims arising out of or related to the Contract, except those waived shall, be subject to mediation~~ Owner and Contractor expressly agree that mediation shall be a condition precedent to the initiation of any litigation out of such Claims. Claims for injunctive relief shall not be subject to this Section.

§ 15.3.2 ~~The parties shall endeavor to resolve their Claims by mediation Requests for mediation shall be filed in writing, with the other party to the Contract.Mediation shall be subject to and in accordance with Chapter 154 of the Texas Civil Practice & Remedies Code. Mediation shall be conducted by a mutually agreed upon mediator. In the event that the parties are unable to agree on a mediator, then the parties shall jointly request the appointment of a neutral mediator by a District Judge in the county in which the Project is located~~

§ 15.3.3 ~~The parties shall share the mediator's fee equally and, if any filing fee is required, shall share said fee equally. Mediation shall be held within the county where the Owner's main administrative office is located, unless another location is mutually agreed upon by the parties. Agreements reached in mediation shall be reduced to writing, considered for approval by the Owner's Board of Trustees, signed by the parties, if approved by the Board of Trustees, and if signed, shall thereafter be enforceable as provided by the laws of the State of Texas.~~

§ 15.3.4 Any claim not resolved in mediation shall be subject to litigation pursuant to Section 13.1.

§ 15.4 No Arbitration

§ 15.4.1 Notwithstanding anything to the contrary in the Contract Documents or in any document forming a part hereof, there shall be no mandatory arbitration for any dispute arising hereunder.

§ 15.4.1.1 ~~A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.~~

§ 15.4.2 ~~The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.~~

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§ 15.4.3 ~~The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.~~

§ 15.4.4 ~~**Consolidation or Joinder**~~

§ 15.4.4.1 ~~Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).~~

§ 15.4.4.2 ~~Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.~~

§ 15.4.4.3 ~~The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.~~

15.5 Contractor stipulates that Owner is a political subdivision of the State of Texas, and, as such, enjoys immunities from suit and liability provided by the Constitution and laws of the State of Texas. By entering into this Contract, Owner does not waive any of its immunities from suit and/or liability, except as otherwise specifically provided herein and as specifically authorized by law.

15.6 In any adjudication under this Contract, reasonable and necessary attorneys' fees may be awarded to the prevailing party.

ARTICLE 16 CONTRACTOR ACCOUNTS, RECORDS, AND INSPECTION

16.1 Contractor, and all subcontractors, shall at all times maintain job records, including, but not limited to, invoices, payment records, payroll records, daily reports, logs, diaries, and job meeting minutes, applicable to the project. Contractor, and all subcontractors, shall make sure reports and records available to inspection by the Owner, Architect, or their respective agents, within five (5) working days of request by Owner, Architect, or their respective agents. Job Records must be retained by Contractor and all subcontractors for at least twelve (12) years after the date of Final Completion of the Project.

16.2 Contractor~~'s~~ and all subcontractors' records, which shall include but not be limited to accounting records (hard copy, as well as computer readable data if it can be made available), written policies and procedures; subcontract files (including proposals of successful and unsuccessful bidders, bid recaps, etc.); original estimates; estimating work sheets; correspondence; back charge logs and supporting documentation; general ledger entries detailing cash and trade discounts earned; bond and insurance rebates and dividends; and any other supporting evidence deemed necessary by the Owner to substantiate charges related to any matters related to the Contract (including interviews with Contractor's personnel and Subcontractor's personnel) shall be open to inspection and subject to audit and/or reproduction by Owner's agent or its authorized representative to the extent necessary to adequately permit evaluation and verification of (a) Contractor compliance with Contract requirements, (b) compliance with Owner's business ethics policies, and (c) compliance with provisions for pricing or claims submitted by the Contractor or any of its payees. The Owner or its designee shall be afforded access to all of the Contractor and all subcontractors'~~s~~ records pursuant to the provisions of this Article throughout the term of this Contract and for a period of twelve (12) years after final payment or longer if required by law.

ARTICLE 17 BUSINESS ETHICS

17.1 During the course of pursuing contracts, and the course of Contract performance, Contractor and its Subcontractors and vendors will maintain business ethics standards aimed at avoiding real or apparent impropriety or conflicts of interest. No substantial gifts, entertainment, payments, loans or other considerations beyond that which would be collectively categorized as incidental shall be made to any personnel of the Owner, its Program Managers, or its Architects, or to family members of any of them. At any time Contractor believes there may have

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been a violation of this obligation, Contractor shall notify Owner of the possible violation. Owner is entitled to request a representation letter from Contractor, its Subcontractors or vendors at any time to disclose all things of value passing from Contractor, its Subcontractors or vendors to Owner's personnel, its Program Managers and its Architects

17.2 The Owner may, by written notice to the Contractor, cancel the Contract for Construction without liability to the Contractor if it is determined by the Owner that gratuities, in the form of entertainment, gifts, or anything of monetary value, were offered or given by the Contractor, or any agent, or representative of the Contractor, to any officer or employee of the Dallas Independent School District with a view toward securing a contract or securing favorable treatment with respect to the awarding, amending, or making of any determinations with the respect to the performing of such a contract. In the event the Construction ~~Agreement~~Contract is cancelled by the Owner pursuant to this provision, Owner shall be entitled, in addition to any other rights and remedies, to recover or withhold the amount of the cost incurred by the Contractor in providing such gratuities.

DRAFT

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Executed this day of , .

OWNER:	**CONTRACTOR:**
	By:
Title:	**Title:**
DALLAS INDEPENDENT SCHOOL DISTRICT	**GENERAL CONTRACTOR NAME**
OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
Dwayne Thompson, Chief Business Officer	GC Signer's Printed Name, Title
(Printed name and title) Date	*(Printed name and title)* Date

Approved As To Form:

SCHOOL ATTORNEY *(Signature)* Date

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BOND NO. _____

TEXAS STATUTORY PERFORMANCE BOND
(PUBLIC WORKS)

THE STATE OF TEXAS)
COUNTY OF DALLAS)

KNOW ALL BY THESE PRESENTS

That, _____
(Legal Name of Contractor)

(hereinafter called the Principal), as Principal, and

_____
(Legal Name of Surety)

a corporation organized and existing under the laws of the State of _____, with its principal office in the city of _____, licensed to do business in the State of Texas and admitted to write bonds, as surety, (hereinafter called the Surety), are held and firmly bound unto the Dallas Independent School District, (hereinafter called the Obligee), in the amount of

$_____
(Numeric)

(_____**)**
(Words)

for the payment whereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written contract with the Obligee, dated the

_____ of _____, 20____, generally described as:

_____

_____

_____

_____

_____

(List Project Description From Agreement)

to do and perform certain construction work as provided in said contract and the related plans, specifications, general conditions and other contract documents, all of which are by reference made a part hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, the conditions of this Obligation is such that if the Principal shall faithfully perform all of the work in accordance with the plans, specifications, general conditions and contract documents, and shall faithfully perform each, every and all other obligations incumbent upon him under the terms of said written contract referred to, and shall fully indemnify and save harmless the Obligee from all costs, expense and damage which it may suffer or incur because of Principal's default, or failure so to do, then this obligation shall be void, otherwise it shall remain in full force and effect.

BOND NO. _____

In the event Principal shall default in the faithful performance of the work called for by said written contract, plans, specifications and contract documents, the Surety shall within 15 days of the determination of default (determined as provided in said contract, general conditions and contract documents) take over and assume completion of said contract, or within such 15 day period make other arrangements satisfactory with the Obligee for completion of the contract, and said Surety shall become entitled thereupon to the payment or benefit of the balance of the contract price as the same matures according to its terms.

The Surety, for the protection of the Obligee herein, waives notice of, and hereby consents to any subsequent modification or alteration both in the work to be performed by the Principal, and the consequent price or sums to be paid by the Obligee, as well as any other change, or amendment, addition or deletion in the contract documents during the progress of the work, including but not limited to all extensions of time or other indulgences permitted the Principal.

Notwithstanding any other provision; the liability of the Surety on this bond shall never exceed the penal sum stated in first paragraph.

This Performance Bond is given in compliance with the terms and provisions of Chapter 2253 of the Texas Government Code as amended by the Acts of Legislature, and all liabilities on this bond shall be determined in accordance with the provisions of said Chapter, to the same extent as if it were copied at length herein. This bond and all of the provisions herein contained shall be solely for the protection of the named Obligee which has awarded the contract referred to.

The undersigned, corporate Surety, does by the execution of this Bond solemnly warrant and represent that it is duly authorized to do business in Texas.

IN WITNESS WHEREOF, the said Principal and Surety have signed and sealed this instrument this ____ day of _____, 20_____.

CONTRACTOR AS PRINCIPAL:

_____
Name of Company (Please print or type)

Seal: *(if any)*

_____
Signature of Authorized Company Representative

_____
Name & Title of Authorized Company Representative (Please print or type)

_____
Witness

_____
Attest

SURETY:

_____
Name of Company (Please print or type)

_____
Signature of Attorney-In-Fact

_____
Name & Title (Please print or type)

BOND NO. _____

(Performance Bond Continued from Page 2)

NOTE:

1) This Performance Bond applies to all contracts in excess of $100,000.00 involving a contract for construction, alteration or repair of any public building or the completion or prosecution of any public work.

2) This bond must be payable to the awarding authority, Dallas Independent School District, as the named Obligee, and it must be approved as to form by such awarding authority.

3) This bond must be furnished before any work is commenced.

4) Surety must be a corporate surety duly authorized to do business in Texas.

5) This PERFORMANCE BOND must be in the full amount of the contract which it secures.

6) Power of Attorney from Corporate Surety must be attached to this Performance Bond.

BOND NO. _____

TEXAS STATUTORY PAYMENT BOND
(PUBLIC WORKS)

THE STATE OF TEXAS)
COUNTY OF DALLAS)

KNOW ALL BY THESE PRESENTS

That, _____
(Legal Name of Contractor)

(hereinafter called the Principal), as Principal, and

_____
(Legal Name of Surety)

a corporation organized and existing under the laws of the State of _____, with its principal office in the city of _____, licensed to do business in the State of Texas and admitted to write bonds, as surety, (hereinafter called the Surety), are held and firmly bound unto the Dallas Independent School District, (hereinafter called the Obligee), in the amount of

$_____
(Numeric)

(_____**)**
(Words)

for the payment whereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written contract with the Obligee, dated the

_____ of _____, 20____, generally described as:

_____

_____

_____

_____

_____

(List Project Description From Agreement)

to do and perform certain construction work as provided in said contract and the related plans, specifications, general conditions and other contract documents, all of which are by reference made a part hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, the conditions of this Obligation is such that if the Principal shall promptly make payment to all claimants supplying labor and material (as hereafter defined) in the prosecution of the work provided in said contract, the related plans, specifications, general conditions and contract documents, then this obligation shall be void, otherwise it shall remain in full force and effect.

BOND NO. _____

This Payment Bond is given in compliance with the terms and provisions of Chapter 2253 of the Texas Government Code as amended by the Acts of Legislature, and all liabilities on this bond shall be determined in accordance with the provisions of said Chapter, to the same extent as if it were copied at length herein. The claimants referred to in this bond are those defined by such Chapter 2253, and this bond shall be solely for the protection of all such claimants supplying labor and material as defined in such Chapter, in the prosecution of the work provided for in said contract, and shall be for the use of such claimant and none other.

The undersigned, corporate Surety, does by the execution of this Bond solemnly warrant and represent that it is duly authorized to do business in Texas.

IN WITNESS WHEREOF, the said Principal and Surety have signed and sealed this instrument this _____ day of _____, 20_____.

CONTRACTOR AS PRINCIPAL:

_____
Name of Company (Please print or type)

Seal: *(if any)*

_____
Signature of Authorized Company Representative

_____
Name & Title of Authorized Company Representative (Please print or type)

_____
Witness

_____
Attest

SURETY:

_____
Name of Company (Please print or type)

_____
Signature of Attorney-In-Fact

_____
Name & Title (Please print or type)

(Payment Bond Continued from Page 2)

NOTE:

1) This Payment Bond applies to all contracts in excess of $25,000.00 involving a contract for construction, alteration or repair of any public building or the completion or prosecution of any public work.

2) This bond must be payable to the awarding authority, Dallas Independent School District, as the named Obligee, and it must be approved as to form by such awarding authority.

3) This bond must be furnished before any work is commenced.

4) Surety must be a corporate surety duly authorized to do business in Texas.

5) This PAYMENT BOND must be in the FULL amount of the contract which it secures.

6) Power of Attorney from Corporate Surety must be attached to this Payment Bond.

Construction Services
Minimum Safety Program Guidelines

2023 Revision

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DALLAS ISD DISCLAIMER

The purpose of the Construction Minimum Safety Program Guidelines Manual, developed for the Dallas Independent School District, is to assist in the development and implementation of appropriate safety standards. This manual is prepared for use as a minimum guideline for safety during the construction, renovation, and expansion activities to be completed by independent contractors. The program is based on applicable government regulations; insurance related safety/risk management requirements, accepted safety practices within the construction industry and common sense.

The maintenance of safe premises, operations and equipment, protection of the faculty, students, and community, and the avoidance of unsafe conditions and practices (during all construction phases) are the responsibility of the General Contractors and Subcontractors performing the construction work. The Program Manager will provide safety oversight of the Contractor's Safety Program. While mandatory, compliance with the provisions of this Construction Minimum Safety Program Guidelines Manual will not guarantee or ensure compliance with the requirements of the Department of Labor, Occupational Safety and Health Act (29 CFR 1926 and 29 CFR 1910). This manual is intended to provide a working, uniform minimal level of program guidelines to assist or provide direction to the Contractors. This manual is not intended to replace the need for each Contractor to establish and maintain a proper Illness and Injury Prevention Program as required by the Department of Labor, Occupational Safety and Health Act (29 CFR 1926 and 29 CFR 1910) and the State of Texas.

The Dallas Independent School District, and its Agents, Consultants, etc., assume no liability for the manual's contents or for any safety related service(s) that may be provided during the course of the project.

This Manual is intended to provide a working, uniform minimal level of program guidelines to assist or provide direction to Contractors. This Manual is not intended to replace the need for each Contractor to establish and maintain a proper Illness and Injury Prevention Program as required by the Department of Labor, Occupational Safety and Health Act (29 CFR 1926 and 29 CFR 1910) and the State of Texas.

References to "Bond Program" must refer to the Dallas Independent School District 2020 and 2015 Bond Programs and other projects managed by the Dallas Independent School District's Construction Services Department as appropriate for the project for which work is to be performed.

Note: If a situation arises that is not covered by the Contractor's Safety Manual or the Construction Minimum Safety Guidelines Manual, please discuss it with your project manager and/or call the Owner's Representative. For additional information regarding the guidelines set forth within this manual, please contact:

Dallas ISD Bond Program Safety Manager, Alvaro Meza
Direct (972) 925-7219 | Mobile (214) 435-2204 | Email almeza@dallasisd.org

2. FOREWORD

This Manual has been compiled to present Loss Control activities and guidelines. Contractors are expected to meet or exceed these minimum guidelines.

The information and suggestions summarized in this Manual were compiled from sources believed to be reliable. It cannot be assumed that this material includes every loss potential, code violation or exception to good practice and, therefore, we cannot guarantee its completeness.

It is solely the Contractor's responsibility to conform to the provisions of this Manual and standards set forth under the William-Steiger Occupational Safety and Health Act of 1970 and, as amended, other Federal Regulations, Environmental Nuisances Considered Hazardous as they apply to state, and local regulations. The General Contractor must ensure that each of its Subcontractors comply with the requirements of this Manual.

We should also emphasize that, as with all other aspects of the work, the Contractor's selection of means and methods is his own, and that any and all suggestions contained in this Manual are only representative of the types of techniques and practices which the Contractor may choose to employ on this project.

3. POLICY STATEMENT

The principles of safety and loss control reflect a determination by Dallas Independent School District to prevent injuries to the general public and workers, as well as to prevent damage to property and equipment.

The District considers no phase of construction or administration of greater importance than accident prevention and asserts that accidents which result in personal injury and damage to property and equipment represent needless waste and loss. It must be the policy of the District for Contractors to conduct all operations safely and thereby prevent injuries to persons and damage to property.

Planning for safety must start with the design and continue through purchasing, fabrication, and construction in all phases of the Bond Program. All practical steps must be taken to maintain a safe place to work. The Contractor must accept the responsibility for safety and loss prevention and must be responsible for thorough safety and loss control training and instruction of its employees.

The objective of this policy is to establish throughout the entire Dallas Independent School District Bond Program Construction Projects the concept that the prevention of accidents and protection of property is most important and, therefore, must receive top priority, support, and participation.

4. PROGRAM OBJECTIVES

The Dallas Independent School District Construction Minimum Safety Program Guidelines Manual has been created to supplement the General Contractor's own program to eliminate or reduce hazards and risks associated with the construction projects, prevent accidents, reduce employee injury, prevent damage to property, promote maximum efficiency and effective savings by the reduction of unplanned business interruption.

4.1 Active Participation of All Contractors

Supervisory staff and employees must make the program not only effective, but also successful by coordinating the participants' efforts in performing the following tasks:

a) Provide a safe environment for employees to perform high quality work.
b) Use safety planning as a tool to reduce bodily injury and property damage.
c) Provide inspections to locate and abate unsafe conditions and practices.
d) Protect the public and property immediately adjacent to all construction sites.
e) Educate and train employees through:
    (1) New hire orientation
    (2) Safety meetings
    (3) Safety training, i.e., hazard communication, trenching safety, confined space, etc.
    (4) Mandatory personal protective equipment programs
    (5) Injury reporting and record keeping up to date
    (6) Incident tracking and trends analysis
    (7) Using accident investigation information to abate deficiencies and eliminate any additional losses
f) Contractors of any tier must comply with all Federal, State, and local laws, ordinances, regulations, and the National Fire Protection Association (NFPA) Standards including the Life Safety Code.

NOTE: The Construction Minimum Safety Program Guidelines Manual is to work in conjunction with the Contractor's individual Safety Program. All Contractors are required to implement their own written Safety Program and/or the Construction Minimum Safety Program Guidelines Manual prior to construction activities.

5. LOSS CONTROL RESPONSABILITIES

The effectiveness of this program depends upon the active participation and cooperation of all Engineers, Project Managers, Inspectors, Supervisors, General Contractors, their employees, and Subcontractors. The primary goals of this program are to increase safety awareness, raise safety standards in the work environment, and increase management involvement in the safety process.

5.1 Local Laws and Requirements

Each contractor and each Subcontractor of any tier must comply with the most stringent OSHA, City, County, or Federal regulations governing where the project site resides.

NO FELONY CONVICTION REPRESENTATION

All contractors of any tier must comply with the following:

Sec 44.034, Subsection (a) of the Texas Education Code subparagraph (a) requires that a person or business entity that enters a contract with a school district must give advance notice to the district if the person or an owner or operator of the business entity has been convicted of a felony. The notice must include a general description of the conduct resulting in the conviction of a felony.

A school district may terminate a contract with a person or business entity if the district determines that the person or business entity failed to give notice as required by Subsection (a) or misrepresented the conduct resulting in the conviction. The district must compensate the person or business entity for services performed before the termination of the contract. This section does not apply to a publicly held corporation.

All contracts must comply with the requirements for criminal background checks. All vendors must give advance notice to the District if the person or an owner or operator of the business entity has been convicted of a felony. The notice must include a general description of the conduct resulting in the conviction of a felony. The district may terminate any resulting agreement if the District determines that the person or business entity failed to provide notice as required by this paragraph or misrepresented the conduct resulting in the conviction. This paragraph requiring advance notice does not apply to a publicly held corporation. This paragraph is required by state law, and exceptions permitted in this advance notice do not limit the following requirements.

All vendors will obtain criminal background history record of information that relates to an employee, applicant for employment, or agent of the contractor or consultant if the employee, applicant, or agent has or will have continuing duties related to the contracted services: and the duties are or will be performed on school property or at another location where students are regularly present. The General Contractor or consultant must certify to the District before beginning work and at no less than an annual basis thereafter that criminal history record information has been obtained. General Contractors or consultants must assume all expenses associated with the background checks and must immediately remove any employee or agent who was convicted of a felony, or misdemeanor involving moral turpitude, as defined by Texas law, from District property or other location where students are regularly present.

The District must be the final decider of what constitutes a "location where students are regularly present." General Contractors' or consultants' violation of this section must constitute a substantial failure under any resulting agreement and be grounds for termination.

Unless waived in writing by the Superintendent of Schools or designee, all District vendors must be identified by a photographic identification badge, issued by a District-approved third-party company at the vendor's expense. The third-party company, as detailed in the Purchasing and Financial Activities Manual, must verify the criminal record history information, and may be used to verify compliance with the federal Drug Free Workplace Act of 1988 or its successor, and the federal Education Department General Administrative Regulations, current edition, in its testing and review process.

Employee or agent includes as example, but not by way limitation, persons providing services on the project including all persons or entities performing all or part of the services the General Contractor has undertaken to perform on the project regardless of whether that person has employees. This includes, without limitation, independent contractors, Subcontractors, owner-operators, employees of any such entity, or employees of any entity that furnishes persons to provide services on the project.

Services include, without limitation, providing the hauling, or delivering equipment or materials, or providing labor, transportation, or other service related to a project. Services do not include activities unrelated to the project, such as food/beverage vendors, office supply deliveries, and delivery of portable toilets. The District must have sole discretion to determine what constitutes a "location where students are regularly present." General Contractor's violation of this section must constitute a default under the General Terms and Conditions of the contract.

5.2 Dallas ISD Safety Orientation and Badging

Prior to working on any Dallas ISD property/project, all General Contractors and Subcontractor employees of any tier must obtain a Dallas ISD Bond Program Photographic Identification badge issued by a District approved third-party company at the General Contractor's or Subcontractor's expense. Any replacement for a lost badge should be obtained by the issuing third-party company.

A Dallas ISD Bond Program Safety Orientation Sticker (to be placed on the I.D. badge) required prior to working on any Dallas ISD property/project. The Safety Orientation sticker is obtained after completion of the required Dallas ISD Bond Program's Safety Orientation provided by the Bond Program's Safety Department. Replacement of the safety orientation sticker must be requested through the Dallas ISD Bond Safety Director or designee. Please see Attachment I for the Dallas ISD Orientation location and schedule.

5.3 Campus Readiness

Campus Readiness is a checkpoint/documented safety inspection that must be completed prior to the start and/or return of campus staff and students to ensure the sustainability of proper separation of all areas and conditions affected by construction activities.

The effectiveness of this checkpoint depends heavily upon the active participation and cooperation of all General Contractors, their employees, engineers, project managers, inspectors, supervisors, and Subcontractors of any tier.

The General Contractor must submit a completed copy of the Campus Readiness Form as EXHIBIT A to the Owner's Representative one (1) working day prior to the return or arrival of campus staff and students, as made part of the Construction Minimum Safety Program Guidelines. Campus Readiness Forms must include photographs as confirmation of existing site-conditions. Guidelines for ensuring a consistent approach to this checkpoint are as follows:

(1) Ensure all areas affected by construction are properly separated from staff, students, and the general public.
(2) A completed copy of the Campus Readiness Form, along with photographs of each affected area must be provided to the Owner's Representative one (1) working day prior to the return of staff and students.
(3) Communicate the significance of adequate separation of construction activities to all contractors of any tier.
(4) A follow-up inspection must be conducted to ensure proper separation of construction activities remain constant.

5.4 Protecting the General Public

Every precaution must be taken to prevent injury to pedestrians or damage to the property of others. The public must be considered as any person not employed by the General Contractor or Subcontractor of any tier.

Among the precautions to be taken are the following:

a) Work must be performed in a public area only when specified by the Contract or the District in writing
b) Every step necessary must be taken to protect and maintain work areas that interface with public sidewalks, building entrances (lobbies, corridors, aisles, etc.), stairways, and roadways.
c) This protection must include but not be limited to installing and maintaining the appropriate barricades, fences, guardrails, overhead protection, partitions, signs, shields, which must be adequately visible. Protection against any additional harmful exposure must also be provided.
d) All travel ways, access, emergency exits, and egress points must always be maintained clear of obstructions.
e) Warning signs are to be conspicuously positioned and a flag person must be assigned when moving equipment that may encounter pedestrians or private vehicles.

f) Overhead protection must be in accordance with the laws of the jurisdiction where the project resides.

g) Each project work area must be protected by a fence constructed of wood or metal and stand at least six (6) feet high to prevent incidental public entry.

h) Fences from construction areas should separate all playgrounds.

i) All fencing must be inspected daily, and repairs made where necessary to prevent unauthorized access.

j) Guardrails must be made of rigid materials and comply with OSHA regulations.

k) Barricades for the general public and/or public roadways must always be secured against accidental displacement and in place, except when temporary removal is required. At such times, a trained flag person must be assigned to control the unprotected area.

l) Should a permanent sidewalk require obstruction or removal, a temporary alternative pedestrian walkway must be provided. Guardrails must be installed on both sides of any temporary walkway that has a fall exposure.

m) When emergency exits must be re-routed, the General Contractor must provide the necessary signs, maps etc. that will show where the nearest emergency exits are located.

5.5 Work Performed Near Existing District Right-of-Way

For any construction equipment (such as cranes, concrete pump trucks, and back hoes) that could encroach on the District's operating right-of-way, the General Contractor must submit and obtain approval from the District for a plan describing the use of such equipment, and the necessary precautions to be taken to preclude any accidental encroachment on the right-of-way.

5.6 General Contractors

The Contractor is responsible for accident prevention and job-site safety. The extent to which these program objectives are met depends upon active management promotion and support of the Construction Minimum Safety Program Guidelines and the complete cooperation of Subcontractors, job site supervisors, and construction personnel in carrying out the following basic procedures:

a) All work must be pre-planned to minimize personal injury, property damage, and loss of production time.

b) General Contractors must maintain a system of prompt detection and correction of unsafe practices and conditions.

c) All Contractor and Subcontractor employees of any tier must successfully complete a site-specific orientation and indoctrination program as described in Section 5.9 of this manual.

d) Site records must be maintained to assure compliance with all OSHA, Federal, and State Regulations and the Construction Minimum Safety Program Guidelines. Site records must include, but not be limited to, the following:

(1) Weekly Toolbox Talk Meeting Agenda/Sign-in Sheets
(2) Incident Investigations
(3) Corrective Action Plan
(4) Worker Training Documentation
(5) Hazard Communication Program
(6) Fire Prevention Plan
(7) Silica Control Plan
(8) Campus Readiness
(9) OSHA 300 Logs
(10) Safety Inspection Reports
(11) Substance abuse program
(12) Site-Specific Orientation
(13) Daily Job hazard analysis (JHA)
(14) Daily Sign-in Sheets

e) General Contractor and Subcontractor safety representatives of any tier must attend at minimum one (1) documented monthly safety committee meeting.

f) Each General Contractor must send a company representative to attend monthly safety committee meetings, or more frequently, as may be required for unusual circumstances and situations.

g) General Contractors must ensure all Subcontractors of any tier comply with the established policies and procedures to ensure adequate compliance with all applicable Federal and/or State Laws and Standards.

h) The General Contractor must maintain a paper copy of the "Construction Minimum Safety Program Guidelines Manual" at each project site.

i) In the event of a conflict and/or ambiguity between various statutes or safety provisions, the stricter provision must apply.

j) The General Contractor must provide additional training when necessary for all its employees and must assure that each Subcontractor provides additional training when necessary for all of its employees. All training must be documented.

k) General Contractors must maintain a Daily Sign-in Sheet for the tracking of its construction workers in and out of the project each day.

NOTE: No requested advice from the representatives of Marsh Inc., Architect, Engineer, or the District must in any way relieve, alter, change, or amend any of the General Contractor's expressed, implied, or inherent legal and/or contractual obligations. Furthermore, the authority vested in the District and its designated representatives, including Marsh Inc. to act on matters regarding safety, must not in any way reduce the General Contractor's responsibility for safety and accident prevention. The District and its representatives, including Marsh Inc. are obligated only to notify the General Contractor of observed instances in which the General Contractor failed to fulfill their own obligations.

5.7 Site-Specific Safety Plan

Within fourteen calendar (14) days after the Notice of Award, but not later than the Preconstruction Conference, the General Contractor must submit a copy of the Site-Specific Safety Plan together with a letter of Management's Statement of Policy, signed by an officer of the company in relation to its contract, to the Owner's Representative and include all applicable criteria as listed in Attachment II (Site-Specific Safety Plan Guidelines) of this manual.

5.8 Work Areas

The General Contractor must provide a safe work area for its employees, Subcontractors of any tier, campus occupants, and the general public. The General Contractor may seek the District's assistance to resolve complex construction safety problems.

5.9 Site-Specific Safety Orientation

Prior to the start of work, each General Contractor and Subcontractor employee of any tier must receive a Site-Specific Safety Orientation. This orientation must be conducted by the General Contractor's Safety Representative and include project-specific safety requirements, protection of school children, public safety, proper use of personal protective equipment, and safe work practices.

a) Site-specific orientations must be no less than thirty **(30) minutes**.
b) To verify that the employee has received and understands this indoctrination, the employee must sign a "sign-in sheet", which the General Contractor must keep on file.
c) It is the responsibility of the General Contractor to ensure that non-English speaking employees receive these same instructions in a language they understand.

5.10 Jobsite Trailer Postings

On a weekly basis, the General Contractor must plan and execute its work with the utmost care and in coordination with the campus principal to not endanger the students' safety and to provide its Subcontractors with the most up to date project information available. To this end, the below items must be updated weekly and posted for Subcontractor's ready reference:

(1) The number of weeks remaining until Substantial Completion must be posted on the door.
(2) The Project Team's Contact List (phone numbers and email) must be posted on the door.
(3) A complete copy of the Operations Parameters must be posted on the wall.
(4) A colored copy of the General Contractor's GPR Report must be Posted on the wall and redlined anytime changes to utility locations are made.
(5) A Site Map showing the location of each utility shutdown valve must be posted on the wall.
(6) A copy of the project 's Baseline Schedule must be posted on the wall.
(7) A copy of the Three (3) Week Lookahead Schedule must be posted on the wall.
(8) A copy of the project's Phasing Plan must be posted on the wall.
(9) A hard copy of the last OAC Hand Outs must be posted on the wall.

(10) The Construction Drawings must be posted at the jobsite trailer and red lined weekly.

(11) A copy of the DISD Crisis Communication Guidelines Poster (Attachment III) must be posted on the wall.

5.11 General Contractor Project Manager

Responsibilities of the Project Manager must include, but are not limited to:

a) Plan and execute all work to comply with the stated objectives of the Construction Minimum Safety Program Guidelines Manual.

b) Comply with all the provisions of the contract dealing with safety and accident prevention requirements.

c) Require project and job superintendents, safety representatives, and project foremen to enforce the federal, state, and local safety codes and regulations.

d) Cooperate with the Owner's Representative.

e) Authorize necessary action to correct sub-standard safety conditions reported or observed.

f) Review and take necessary action with respect to safety matters through directives or personal interviews with superintendents, project foreman, and/or Subcontractors' management.

g) Share project related experiences (i.e., insight, questions, incidents, etc.) with other participants and attendees present at monthly Bond Safety Committee Meetings.

5.12 General Contractor Safety Representative

At the General Contractor's discretion, the Site-Superintendent or Project Foreman may serve in the capacity of Safety Representative if the individual selected to serve can perform the minimum criteria listed below for Safety Representative.

The designated Site Safety Representative must hold an OSHA 30hr (within five (5) years of completion) and a valid First Aid/CPR certification, and minimum of 3 years of experience managing on site safety responsibilities. The Site Safety Representative must not have any other duties than monitor all Subcontractor's compliancy with Federal, State, Local ordinances, in addition to the Minimum Construction Safety Guidelines and the Contractor's Safety Manual. Moreover, the Site-safety Representative must ensure all non-compliant conditions or unsafe behavior is immediately corrected.

NOTE: If the person designated is not able to successfully perform the minimum criteria listed for safety representative, an on-site full-time site safety may be required.

Responsibilities of the designated Safety Representative must include, but are not limited to:

a) Ensure that the Construction Minimum Safety Program Guidelines are carried out.
b) Monitor employee compliance with all jobsite rules and regulations and ensuring that the rules are improved as necessary.
c) Make daily safety inspections of jobsites and take necessary immediate corrective action to eliminate unsafe acts and conditions.
d) Ensure the OSHA 300 Form Accident Report is properly completed and distributed.
e) Review and assist when necessary, accidents and incidents to ensure that injured employees follow proper reporting procedures, and that Accident Investigation Reports are completed accurately. Where appropriate, recommend immediate corrective action to the project manager or superintendent.
f) Provide project foremen with appropriate material for use in conducting weekly "toolbox" safety meetings.
g) Periodically attend project foreman's "toolbox" safety meetings and evaluate their effectiveness.
h) Implement safety-training programs, for supervisors and employees as they apply to their specific responsibilities where the Safety Representative identifies a need.
i) Encourage programs for recognition of individual employee's safety efforts and their contribution toward improved work methods.
j) Responsible for the control and availability of the necessary safety equipment, including employee's personal protective equipment.
k) Coordinate safety activities with those of the District's personnel, the Safety Representatives of Subcontractors, and the Owner's Representative.
l) Share project related experiences (i.e., insight, questions, incidents, etc.) with other participants and attendees present at monthly Bond Safety Committee Meetings.

5.13 General Contractor Site-Superintendent

It is the responsibility of superintendents to provide constant and thorough supervision of ongoing activities including safety of its employees and the employees of all Subcontractors. The Contractor's Superintendent must hold an OSHA 30hr (within five (5) years of completion) and a valid First Aid/CPR certification.

Responsibilities of the Superintendent include, but are not limited to:

a) At minimum, one General Contractor representative who has been designated as Competent Person must be present while contractors of any tier are on-site.
b) Planning and executing all work as to comply with stated objectives of the Minimum Safety Program Guidelines Manual, and work with the Safety Representative to assure the effectiveness of the program.
c) Plan all work far enough in advance so that proper safety procedures and equipment can be provided before work begins.

d) Ensure that no unsafe conditions are created, i.e., poor housekeeping, removal of guardrails, etc.
e) Take immediate action to eliminate, correct, or resolve any unsafe conditions or unsafe acts, which are observed or discovered.
f) Ensure that periodic inspections of safety equipment and personal protective equipment is conducted and enforce the use of such equipment.
g) Ensure that injured employees obtain prompt medical attention.
h) Participate in the completion of supervisory accident investigation of all accidents and suggest ways to prevent similar accidents.
i) Periodically attend foreman's weekly “toolbox” safety meetings and evaluate their effectiveness.
j) Share project related experiences (i.e., insight, questions, incidents, etc.) with other participants and attendees present at monthly Bond Safety Committee Meetings.

5.14 Subcontractor Competent Person

Subcontractor Foremen/Competent Person(s) are an integral part of an effective safety program and the amount of effort they put into accident prevention on their daily assignments helps determine whether or not a good accident record is maintained. The Subcontractor’s designated Competent Person must hold an OSHA 10hr (within five (5) years of completion) and a valid First Aid/CPR certification.

In accordance with 29 CFR 1926.32(f), a "Competent Person" is defined as "one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has **authorization** to take prompt corrective measures to eliminate them."

Responsibilities of the Subcontractor Competent Person shall include, but are not limited to:

a) At minimum, one Subcontractor representative who has been designated as Competent Person must be present while work is being performed (work includes self-performing and/or its contractors of any tier).
b) Instruct employees, under their supervision, on safe work practices and work methods at the time of work assignments.
c) Competent Person(s) must be trained and certified in First Aid/CPR and possess an OSHA 10-hour certification within 5 years of the issuing date.
d) Report immediately to the Safety Representative and superintendent of any violations of project safety that cannot be immediately corrected.
e) Supply and enforce the use of proper protective equipment and suitable tools for the project.
f) Verify that no unsafe practices or conditions are allowed on any part of their job.
g) Acquaint their workers with all applicable safety requirements and enforce them.
h) Set a good example for their workers. Lead by example.

i) Participate in the investigation of accidents and incidents to determine facts necessary to take corrective action.

j) Supply information for completion of the Accident Report and Investigation Form (directed by the General Contractor's Safety Representative and/or project Superintendent).

k) See that prompt first aid is administered to injured employees.

l) Hold weekly "Toolbox Talk" safety meetings with their employees

m) Weekly "toolbox" safety meetings must include:

   (1) Discuss observed unsafe work practices or conditions and corrective action taken to prevent a similar incident or condition.

   (2) Review the accident experience of their crew.

   (3) Encourage safety suggestions from their employees and report them to the Safety Representative.

   (4) All safety meetings are to be documented and kept in job trailer for review if requested.

n) Share project related experiences (i.e., insight, questions, incidents, etc.) with other participants and attendees present at monthly Bond Safety Committee Meetings.

5.15 Safety Committee

Under the direction of the District, a safety committee will be appointed from the selected company safety representatives and management. This committee will meet on a monthly basis for review of any safety issues needing attention as well as for investigation of serious accidents that result in loss of life, injury to several workers or pedestrians, or a major property loss. All employees of any tier must cooperate when necessary with any safety committee investigation. The committee will submit a report to the District at the conclusion of the investigation.

5.16 Bond Safety Committee Meeting

Bond Safety Committee Meetings are held monthly at the Dallas ISD Bond Office and must consist of the General Contractor's Project Manager, Superintendent, Safety Representative, Insurance Carriers' Representative (when available), and a Safety Representative from each Program Manager and Contractor currently working on the Bond Program.

The purpose of the meetings must be to create awareness, improve communications, encourage feedback, and solve problems. The Contractor's Safety Representative must share project related experiences (i.e., insight, questions, incidents, etc.) with other participants and attendees present at such meetings.

5.17 Weekly Site-Safety "Toolbox Talk" Meetings

Toolbox talks are weekly project safety meetings used to reinforce safety basics, focus on high-risk scenarios, and to inform workers about changes to the jobsite and working conditions that may have occurred. General Contractors must discuss any near miss, accidents, or injuries that have occurred and how they could have been prevented.

a) The General Contractor and all Subcontractors are required to hold a minimum of **one 15-minute site-safety Toolbox Talk meeting per week**.
b) All workers on the project site, including site Project Management team members, must attend a weekly safety Toolbox Talks, which must be presented in English and all other languages that are natively spoken at the project.
c) The General Contractor's safety representative may deliver each talk to the entire project population or each Subcontractor's safety representative may deliver individual meetings to their specific trade and/or group.
d) The General Contractor's safety representative must periodically participate and review individual meetings to ensure effectiveness.
e) The General Contractor must collect and maintain copies of all sign-in sheets for every meeting.
f) Meetings must address appropriate topics for the current and future work operations and current site conditions. In addition, the General Contractor must communicate information discussed during the Monthly Bond Safety Committee Meeting, inspection results, and other project safety-related topics.

5.18 First Aid and Medical Treatment

Emergency "911" telephone number must be used for all accidents requiring the response of Emergency Medical Services, Fire Department or Police.

"First Aid" can be defined as the immediate or temporary care given to a person who is ill or who has been injured. Any person trained in first aid should be able to recognize life (or other physical) threatening conditions and take some effective action to help keep the victim alive and in the best possible condition until professional medical help arrives. CFR-1926.50

For each shift of operation, all General Contractors must have on-site supervisors who are formally trained and current on basic first aid and CPR. These supervisors will be expected to provide emergency medical first aid on their jobs for all employees but in no case will be designated as the "First Responder" for the project

a) First aid supplies must be readily accessible on each project site. The first aid cabinet/kit must always be adequately stocked.
b) All injuries are to be reported to the immediate supervisor, no matter how minor. Treatment will be administered, and a report made of the injury. The employee's supervisor is responsible for making arrangements to transport the employee to and from the closest medical clinic/hospital.

c) Under no circumstances must the employee be allowed to drive him or herself to the medical clinic/hospital. All seriously injured personnel will be transported by ambulance to the nearest hospital.
d) All employees must notify their supervisor prior to leaving the site because of illness or injury.
e) If any employee obtains medical treatment without prior notification to the superintendent, the employee must notify the superintendent at the start of the next scheduled workday.
f) Prior to returning to work after treatment by a physician for a work-related injury, the employee must present a return-to-work form from the treating physician.

5.19 Incident Investigations

When an accident or near miss with major potential for a loss occurs, the supervisor of the crew(s) involved must perform an accident investigation. After the root cause has been identified and recommendations for corrective action have been determined, a procedure may be implemented to prevent a similar incident from occurring again.

5.20 Substance Abuse

Dallas Independent School District (Dallas ISD) is committed to the establishment and maintenance of a safe and efficient work environment for all personnel, free from the effects of alcohol, illegal drugs, and other controlled substances.

5.20.1 Policy:

District prohibits on their property, the use, possession, concealment, transportation, promotion, or sale of any of the following:

(1) Alcoholic beverages.
(2) Marijuana and other illegal drugs
(3) Look-a-likes and designer drugs
(4) Drug paraphernalia
(5) Controlled substances such as medications when usage is abused or when the substance is possessed without proper prescription labeling.

All person(s) directly or indirectly involved with the 2015 or 2020 Bond program, must not be under the influence of any of the above substances while on Dallas ISD property or to use, possess, conceal, transport, promote or sell any of the above substances will be grounds for disciplinary action, up to and including removal from the Bond program.

5.20.2 Other Controlled Items

Dallas ISD prohibits the use, possession, concealment, transportation, promotion, or sale of the following controlled items:

(1) Firearms, weapons, and ammunition (except when authorized for security reasons)
(2) Switchblades

(3) Unauthorized explosives including fireworks

(4) Stolen Property

5.20.3 General Contractor Requirements

General Contractors, including its Subcontractors of any tier, must employ a workforce free of the influence or possession of illegal drugs or alcohol while on District's property.

a) As a condition of employment, employees must submit to substance abuse screening (five-panel drug screening) and breath alcohol testing for Pre-employment, Post-accident/Incident, Just-cause, Random selection, and Return to work.

b) The Contractor must pay for all costs associated with a NIDA-approved laboratory to conduct substance abuse testing and breath alcohol testing.

c) All General Contractors and Subcontractors are responsible for reporting to the Bond Program Safety Manager any incidents in violation of the substance abuse program and the disposition of the violation. The Owner or its designee must reserve the right, but not the obligation, to order the Contractor to send a worker home for the day, or to remove a worker from any Bond Program Project, for his/her failure to comply with anti-substance abuse policies, and the Contractor must promptly comply with all such orders.

d) General Contractors and Subcontractors of any tier must declare one (1) or more employees to be its designated Competent Person.

e) The designated Competent Person must be dedicated to the Project for on-site safety responsibilities and must be on the project site when any part of the applicable General Contractor's or Subcontractor's work is being performed.

5.20.4 Definitions:

Property must refer to all land owned by the District, to all property thereon; buildings, structures, facilities, platforms, fixtures, tunnels, installations, and to all project vehicles, stationary or mobile equipment, whether owned or leased. This definition may also include other work locations while in the scope and course of employment on the District's Construction Projects.

5.21 Site Visitors and Group Tours

Normally there are no tours during a construction project. However, it is particularly important that a high degree of protection be afforded to all persons on authorized tours of construction worksites.

In the event a tour is authorized, the following instructions must be complied with, as applicable, by the General Contractor and those responsible for arranging such tours:

a) Tours must be scheduled prior to the start or after the end of the workday.

b) In all cases, the Program Manager and the Owner's Representative must be advised of any tour in a timely manner prior to the tour taking place.

c) Group tours must be cleared through the District, allowing maximum advance notice and in compliance with the District's policies and procedures. The District will coordinate the tour arrangements.

d) The General Contractor will coordinate the following with the individual or organization requesting the tour:

(1) Clothing: Visitors will be required to wear pants or slacks, shirt or blouse, and leather or work shoes. Sneakers, high-heeled shoes, and open toed shoes are prohibited.

(2) Minors: Persons under 18 years of age are not permitted on project tours.

(3) Protective Equipment: Hard hats, eye protection, earplugs, and other protective devices will be required, as necessary.

(4) Release and Hold Harmless Agreement: Each visitor must be required to sign a release and hold harmless agreement prior to the commencement of the tour. A sample Visitor's Release and Hold Harmless Agreement is contained in this Manual as Attachment IV.

(5) All visitors must comply with Contractor safety requirements.

(6) All visitors must be escorted by the job-site superintendent, Bond Program Safety Director, or their designated representatives.

e) Designated escorts must familiarize their group(s) with the hazards to be encountered on the tour prior to entering the project site.

f) District representatives, who visit or escort technical and official visitors in hazardous work areas, must notify the General Contractor in advance and must comply with all established construction safety procedures.

6. MINIMUM CONSTRUCTION SAFETY GUIDELINES

6.1 Safe Plan of Action (SPA) Guidelines

A Safe Plan of Action (SPA) is a site-specific comprehensive safety program which outlines what methods, procedures, and equipment will be used when engaged in any of the following nine (9) critical phases of work:

(1) Excavation
(2) Elevated Work
(3) Crane Operations
(4) Steel Erection
(5) Confined Space
(6) Pier Drilling
(7) Demolition
(8) Utility Shutdown
(9) Electrical Shutdown

It is critical that Contractors understand the importance of developing an effectively functioning Safe Plan of Action (SPA) that is pro-active and addresses the potential hazards and exposures to their employees, campus occupants, the public, and other trades within the affected areas.

a) SPA Documentation must be submitted to the Owner's Representative within **5-7 days** of any planned critical phases of work.
b) The General Contractor must assemble all criteria as listed on the SPA Cover Letter checklist for all critical phases of work.
c) The SPA Cover Letter checklist and its supporting documentation must be combined into a single PDF so that it is an exact electronic version of the physical document that must kept on-site.
d) The General Contractor Safety Manager must review, evaluate, and approve of the SPA for adherence to all applicable federal regulations and the DISD Construction Safety Program Guidelines prior to submitting a copy to the Owner's Representative and the commencement of work.
e) The Owner's Representative may review and respond. Any issues or deficiencies will require the General Contractor to revise and resubmit the document. If no deficiencies are noted, The General Contractor must then schedule the Pre-Work SPA Meeting.
f) The Pre-Work SPA Meeting will be a final review of the complete Cover Letter checklist criteria before proceeding with any planned work. SPA Pre-Work Meetings must be held in-person and on-site. At a minimum, the following persons must be present:
    (1) Sub-Contractor Competent Person
    (2) General Contractor Safety Representative
    (3) Owner's Representative [Optional]

6.2 Repeating Scopes of Work

For repeating types of work that have already gone through the SPA review process, a separate submittal and review will not be required **ONLY** if **ALL** the following conditions have been met:

(1) The General Contractor Safety Manager has reviewed and approved the safety plan
(2) The work performed will be substantially similar to the scope of work as previously approved
(3) The Competent Person(s) listed on the documents has not changed
(4) The Sub Contractor crew list, training records, and certifications have not changed or expired

6.3 Job Hazard Analysis

Planning for the safety of personnel and equipment being used must begin with each phase of construction and continue through project completion. Contractors must plan the safety procedures to be followed for each phase of construction.

a) JHA's must be implemented on any task which may cause bodily injury, damage to property, or equipment e.g., crane lifts, redirecting of foot and or vehicle traffic, use of scaffolding, use of mobile aerial work platforms, and or any other task which pose a high risk.
b) A Job Hazard Analysis (JHA) is required prior of starting any work shift, equipment, or procedure that poses a significant potential for bodily injury and/or property damage.
c) The Job Hazard Analysis must be written by the performing Contractor and submitted to the General Contractor for approval.
d) Contractors must use EXHIBIT B (Job Hazard Analysis Worksheet) or its approved equivalent.
e) The General Contractor's Safety Representative in conjunction with the job site Supervisor is directly responsible for the development and implementation of Job Hazard Analysis (JHA).
f) Daily JHA Meetings must include the General Contractor and/or Subcontractors, their responsible job site supervisors (including the craft supervisor and craft Safety Representative), and any other responsible party who may contribute to the safety of the operation.
g) Employees involved with the project must be instructed of the hazards involved and methods required in eliminating those hazards, including emergency actions to be taken in the event of an accident.
h) Employees must be made aware of the procedures to be used and requirements of the JHA.
i) The JHA serves as an operating procedure and living documents that must be available to all personnel performing the work.
j) The General Contractor and Subcontractor's Safety Representative must retain a copy of all JHAs.

6.4 Personal Protective Equipment

Personal Protective Equipment (PPE) must be required for all persons on any construction site. The construction site is defined as any area within the project perimeter fence and interior renovation areas, excluding offices and office trailers.

PPE includes but is not limited to:

6.4.1 Hard Hats

All persons working, walking, or transiting the construction site must always wear an ANZI-Z-89 approved hardhat. Bump caps are prohibited. Any operation that requires an employee to wear face protection does not preclude the use of head protection. The face protection must be selected so that it can be used in conjunction with the required head protection.

6.4.2 Safety Vest

High visibility vests or high visibility upper body clothing (equivalent to ANSI Class 2 or greater as applicable) must be worn in the construction area. Primary work activities such as traffic control, excavations, rigging from ground level, exterior work at ground level or sub-ground level, earth moving operations, may require ANSI Class 3.

6.4.3 Eye Protection

Employees must wear ANZI Z-87 approved eye protection must be required when construction activities present a potential eye injury from flying debris, physical, chemical, or radiation agents.

6.4.4 Face protection

Face protection must be required when construction activities present a potential face injury from flying debris, physical, chemical, or radiation agents. Any operation that requires an employee to wear face protection does not preclude the use of eye protection. The eye protection must be selected so that it can be used in conjunction with the required face protection.

Any person working near or observing operations requiring additional or specialty eye protection must be equipped with the same type of eye protection that is required for that operation.

6.4.5 Hearing Protection

All contractors of any tier must implement a hearing conservation program when noise exposure is at or above 85 decibels averaged over 8 working hours, or an 8-hour time-weighted average.

6.4.6 Footwear

All employees and vendors in active work areas must wear substantial leather work shoes or work boots. Tennis shoes, sneakers, or other athletic footwear, flipflops, heels (1" +) or any open toe shoes are not acceptable footwear.

6.4.7 Clothing

All employees must be required to wear such additional protective clothing or equipment as required by the hazards involved with the tasks being performed.

a) All clothing should be in good repair, and not loose fitting or dragging in such a manner to pose a hazard from becoming entangled in equipment or machinery.
b) All button shirts will be buttoned or t-shirts with at least 4" sleeves must be worn at all times while on the jobsite. Tank tops, mesh shirts, sweatpants, shorts nor clothing displaying pornographic, or profanity will be allowed.
c) Long hair will be neatly kept under a hardhat as to prevent serious injury caused by entanglement.

6.4.8 Jewelry

No dangling jewelry must be permitted on work sites. Necklaces will be kept inside shirts to prevent possible entanglement in moving equipment and rotating machinery.

6.5 Hazard Communication

The General Contractor's Hazard Communication (Haz-Com) Program must be submitted to the Owner's Representative and made part of the General Contractor's Construction Safety Program and maintained on-site.

a) Contractors must provide all required training, control methods, personal protective equipment, and medical surveillance for its employees as required by OSHA 1926 Subpart Z. Training programs must ensure all employees can at a minimum:
    (1) Understand the program and can identify with hazardous chemicals.
    (2) Understand product-warning labels.
    (3) Know where Safety Data Sheets (SDS) are kept and can interpret them.
b) The General Contractor must maintain copies of Safety Data Sheets (SDS) for all chemicals to be used, stored, and/or maintained on any DISD Project prior to arrival or use.
c) All hazardous materials must be properly labeled per GHS and stored in accordance with applicable laws.
d) Contractors are responsible for proper disposal of hazardous waste in accordance with applicable laws and Environmental Requirements.
e) The General Contractor is responsible for ensuring work zones and potentially affected occupied areas are properly monitored for exposure to toxic and hazardous substances that workers or building occupants may be exposed to. Some examples include but are not limited to the following:
    (1) Asbestos
    (2) Lead
    (3) Hexavalent chromium
    (4) Beryllium
    (5) Silica
    (6) Mold

NOTE: It is the General Contractor's responsibility to monitor for these substances and to communicate with and protect building occupants if exposure is possible.

6.6 Respiratory Protection

When respirators are deemed necessary, the Contractor must have a respiratory program that complies with OSHA regulations. A copy of the Contractor's Respiratory Program must be submitted to the Owner's Representative and made part of the General Contractor's Construction Safety Program and maintained on-site.

a) Contractors of any tier must take all actions necessary to ensure air quality standards are met on the project and in its work areas. The employer shall evaluate emissions caused by their work processes (e.g., welding, running vehicles, etc.) and/or by the materials used.
b) When deemed necessary, employees must be fitted for and instructed in the proper use of respirators that will afford them the maximum protection for the environmental hazard in which they are working. Because of the extensive use of waterproofing, fireproofing, paints and welding processes, these areas may require constant monitoring

6.7 Fire Prevention

All Dallas ISD Schools Are Smoke and Tobacco Free.

The Fire Prevention and Protection Program will be determined for each project by the size and conditions at each project. The project superintendent must be responsible for the proper implementation and administration of the program giving due consideration to the availability of public Fire Departments and the type of work to be performed on the job.

The General Contractor's Site Fire Prevention and Protection Program must be submitted to the Owner's Representative made part of the General Contractor's Construction Safety Program and maintained on-site.

a) Ignition sources are not permitted in areas where flammable or explosives are stored or may be present and must be conspicuously posted: "NO SMOKING, MATCHES OR OPEN FLAMES."
b) Examples of ignition sources include, but are not limited to:
    (1) Smoking
    (2) Electrical cords that are damaged
    (3) Welding, torch cutting, and brazing
    (4) Vehicle engines and electric motors
    (5) Asphalt kettles
    (6) Hotplates
c) Fire Extinguishers of the appropriate type (A: B: C) must be provided, be placed conspicuously and sign posted.
d) Fire extinguishers will be maintained and inspected as required by Federal, State, and local regulations.

e) Fires and open flame devices must not be left unattended. Open burning for personal warming or trash disposal is prohibited.
f) All temporary heating devices must comply with all requirements of CFR 1926.154
g) All flammable liquids, e.g., gasoline, diesel, mixed gas, etc., must be labeled, stored, and dispensed from U.L. approved safety cans. The use or storge of plastic fuel containers is strictly prohibited.
h) Compressed gas cylinders, when not in use, will be secured in an upright position. Fuel and nonfuel cylinders must be separated by a minimum of 20 feet.
i) Flammables or Combustible liquids must not be stored in areas used for exits, stairways, or normally used for the safe passage of people.
j) Outdoor Flammable Storage areas must not be within 20 feet of any building. Minimum distance will also be maintained between storage areas, property lines, streets, alleys, or public ways.
k) Outdoor Portable Tanks must not be stored within 20 feet of any building.
l) Each tank must be labeled: "(Contents of Tank) – Flammable, No Smoking"
m) At least one portable fire extinguisher will be located no less than 25 feet, and no further than 75 feet, from any flammable liquid storage area located outside.
n) All areas of the project must be kept free of accumulations of wood scraps, paper, and other combustible debris.
o) Trash dumpsters must be maintained a minimum of 50 feet away from buildings or other structures.
p) In areas where welding, torching, or any open flame activity is being conducted, a trained fire watch will be posted, and he/she will have no other duties. The fire watch will remain in the hot work location for a minimum of 30 minutes after hot work activities are completed to ensure that no hot areas are present.

6.8 Housekeeping

Housekeeping is a basic requirement to construction safety and must be of primary concern to every superintendent, supervisor, and foreman on the project. The maintenance of a safe, clean work area contributes not only to worker safety, and the elimination of fire hazards, but also to efficient low-cost production.

a) All General Contractor and Subcontractor employees of any tier must collect trash, construction debris, and dispose of daily.
b) All trash and debris must be placed in proper containers, properly stacked, or removed from the jobsite daily.
c) Walking aisles, roadways, and high foot-traffic areas must be kept clear at all times.
d) All welding leads, electrical cords, and torch hoses must be strung a minimum of 7 feet high or positioned so as not to create a tripping hazard.
e) Oily rags and any flammable debris must be placed in closed covered containers at the end of each shift, or otherwise properly disposed of.
f) Tools and materials must not be left where they will create a hazard for others.

g) Spilled liquids should be cleaned up immediately.
h) Toilets, wash-up facilities, and drinking water dispensers are to be kept clean and sanitary.
i) Protruding nails must be bent down or removed from boards, plywood, construction materials, etc.
j) Surplus materials must be returned to storage areas.

6.9 Silica Control

Contractors must reduce unacceptable dust levels either through engineering controls or other means. In either case, the Contractor must provide maximum protection for those exposed to dust. Contractors of any tier are responsible for controlling dust that:

(1) Might endanger the health of children, school staff, and employees.

(2) Creates a nuisance to the general public

6.10 Sanitation

The General Contractor is responsible for obtaining and maintaining an adequate number of portable toilets on the project, as well as areas for hand washing.

a) The total number and gender of all employees working on the jobsite must determine the number of portable toilets required.
b) The General Contractor must also provide or require its Subcontractors to provide potable water.
c) Toilets, wash-up facilities, and drinking water dispensers are to be kept clean and sanitary at all times.

6.11 Demolition and Site Clearance

The General Contractor must ensure the establishment of a written Demolition Procedure that adheres to OSHA, Federal, State, and local regulations. A copy of this procedure must be submitted to the Owner's Representative, made part of the Contractor's Construction Project Safety Manual as EXHIBIT C, and maintained on-site.

a) Prior to commencement of work, a competent person must conduct an engineering survey. This written survey will be considered the basis for an operational work plan.
b) All structures needing support must be braced.
c) All utilities including gas, water, electricity, etc. must be shut down. All pipe work must be purged of any hazardous materials, e.g., flammable, explosive, toxic, etc.
d) All debris chutes will be manufactured of appropriate materials and must be adequately guarded and/or protected.
e) Removal of asbestos, lead, and PCBs must only be conducted by licensed contractors.
f) Remediation activities must adhere to all OSHA, Federal, State, and local regulations.

6.12 Demolition Safe Plan of Action (SPA)

A Demolition Safe Plan of Action (SPA) is a site-specific comprehensive Demolition Program which outlines what methods, procedures, and equipment will be used in its program. This evaluation and program must be in writing and must be submitted to the Owner's Representative prior to any demolition activity. Review and acceptance by the General Contractor Safety Manager is required prior to submission, the start of work, or any demolition activity.

a) General Contractor must coordinate and conduct an on-site Demolition SPA pre-work meeting one week prior to any planned demolition activity. The Cover Letter (EXHIBIT C) must be submitted along with a Safe Plan of Action (SPA). The safety plan must be evaluated and approved by the General Contractor Safety Manager prior to submission.
b) The Demolition SPA pre-work meeting agenda must include discussion about the scope and review of any conditions that may pose a hazard to workers and/or campus occupants as it relates to the planned demolition activity.
c) To hold a Demolition SPA pre-work meeting, at a minimum, the following parties must be present:
    (1) Sub-Contractor Competent Person
    (2) General Contractor Safety Representative
    (3) Owner's Representative [Optional]

6.13 Confined Space Entry

General Contractors must ensure the establishment of a written Confined Space Entry Procedure (when applicable) that adheres to OSHA Regulations. A copy of this procedure (when applicable) must be submitted to the Owner's Representative, made part of the Contractor's Construction Project Safety Manual as EXHIBIT D, and maintained on-site.

a) All personnel connected with any confined space operation must be adequately trained and confirmation of this training must be documented.
b) Confined Space Entry Permits must be used where necessary.
c) Air monitors, rescue tripods, full body harnesses, ventilation equipment, etc. must be available and used when deemed necessary by the General Contractor.

6.14 Confined Space Safe Plan of Action (SPA)

A Confined Space Safe Plan of Action (SPA) is a site-specific comprehensive Confined Space Entry Program which outlines what methods, procedures, and equipment will be used in its program. This evaluation and program must be in writing and must be submitted to the Owner's Representative prior to any confined space entry. Review and acceptance by the General Contractor Safety Manager is required prior to submission, the start of work, or any confined space entry.

a) The General Contractor must coordinate and conduct an on-site Confined Space SPA pre-work meeting 5-7 days prior to any planned confined space entry. The Cover Letter (EXHIBIT D) must be submitted along with a Safe Plan of Action (SPA). The safety

plan must be evaluated and approved by the General Contractor Safety Manager prior to submission.

b) The Confined Space SPA pre-work meeting agenda must include discussion about the scope and review of any conditions that may pose a hazard to workers and/or campus occupants as it relates to the planned confined space work.

c) To hold a Confined Space SPA pre-work meeting, at a minimum, the following parties must be present:

   (1) Sub-Contractor Competent Person

   (2) General Contractor Safety Representative

   (3) Owner's Representative [Optional]

6.15 Trenching and Excavations

The General Contractor must ensure the establishment of a written Trenching and Excavation Procedure that adheres to OSHA Regulations. A copy of this procedure must be submitted to the Owner's Representative, made part of the Contractor's Construction Project Safety Manual as EXHIBIT E, and maintained on-site.

a) The General Contractor must ensure trenching and/or excavation activities are not performed during regular school hours or near occupied school areas.

b) Prior to any excavation activity, the General Contractor Safety Representative or Superintendent must ensure the following:

   (1) Contact Texas811 (1-800-344-8377) for confirmation number.

   (2) Ground penetrating radar (GPR) **and** review of exiting plans must be performed as part of the underground utility locating methods. GPR reports must include an Underground Utility Location Survey/Utility Map which shows the positioning and identification of underground utilities in relation to any planned excavation activity.

   (3) Potholing/hand digging is required within three (3) horizontal feet of "located" centerlines, and in areas where knowledge is lacking.

c) The review of existing plans and any other reasonable efforts must be made to determine if any underground utilities (power lines, water lines, fuel lines, etc.) are present within the boundaries of the proposed work area.

d) As the excavation work approaches the location of any known utilities, the lines must be uncovered, using extreme caution not to disturb the lines, and adequate measures must be taken to protect the lines from damage while the work progresses.

e) All utilities known but not identified must be exposed by hand.

f) All excavation must be inspected daily by a competent person, or after heavy rain, or other change that may have caused a change in ground stability conditions. Any excavation greater than 20 feet must be designed by an engineer and a copy forwarded to the Bond Program Safety Manager for review.

g) Any personnel at the edge of a well, pit, shaft, and similar excavation six (6) feet or more in depth must be protected from falling by guardrail systems, barricades, or covers.

h) Where a guardrail system or barricade is infeasible, the use of personal fall arrest systems are required.

i) Any disturbed areas must be returned to existing and safe condition prior to departure.

j) If the Contractor must make a cut, cavity, trench, or depression in the Earth's surface formed by earth removal, it must comply with the applicable OSHA Regulations.

k) General Contractors must train, or require to be trained, those employees who will work in and around the excavation about the hazards, as required by OSHA, in the areas of daily inspections, soil testing, soil classifications, and protective or support systems.

6.16 Trenching and Excavation Safe Plan of Action (SPA)

A Trenching and Excavation Safe Plan of Action (SPA) is a site-specific comprehensive Trenching/Excavation Program which outlines what methods, procedures, and utility strike prevention efforts will be used in its program. This evaluation and program must be in writing and must be submitted to the Owner's Representative prior to any Trenching/Excavation work. Review and acceptance by the Contractor Safety Manager is required prior to submission and the start of work.

a) General Contractor must coordinate and conduct an on-site Trenching and Excavation SPA pre-dig meeting one week prior to any planned excavation or trenching (hand digging included). The Cover Letter (EXHIBIT E) must be submitted along with a Safe Plan of Action (SPA). The safety plan must be evaluated and approved by the General Contractor Safety Manager prior to submission.

b) The Trenching and Excavation SPA pre-work meeting agenda must include discussion about the scope and review of the existing underground utilities as it relates to the planned trenching/excavation. At the pre-dig meeting, the General Contractor must present a contingency plan regarding any utility struck during execution of such work.

c) To hold a Trenching and Excavation SPA pre-work meeting, at a minimum, the following parties must be present:

   (1) Sub-Contractor Competent Person

   (2) General Contractor Safety Representative

   (3) Owner's Representative [Optional]

NOTE: As defined by OSHA, an excavation as any man-made cut, cavity, trench, or depression in the Earth's surface formed by earth removal. A trench is defined as a narrow excavation (in relation to its length) made below the surface of the ground.

6.17 Pier Drilling

The General Contractor must ensure the establishment of a written Pier Drilling Procedure that adheres to OSHA Regulations. A copy of this procedure must be submitted to the Owner's Representative, made part of the Contractor's Construction Project Safety Manual as EXHIBIT F, and maintained on-site.

a) The Contractor must at no time perform any pier drilling activities during regular school hours or near occupied school areas.

b) Prior to any pier drilling activity, the General Contractor Safety Representative or Superintendent must ensure the following:

   (1) Contact Texas811 (1-800-344-8377) for confirmation number.

   (2) Ground penetrating radar (GPR) **and** review of exiting plans must be performed as part of the underground utility locating methods. GPR reports must include an Underground Utility Location Survey/Utility Map which shows the positioning and identification of underground utilities in relation to any planned excavation activity.

   (3) Potholing/hand digging is required within three (3) horizontal feet of "located" centerlines, and in areas where knowledge is lacking.

c) The review of existing plans and any other reasonable efforts must be made to determine if any underground utilities (power lines, water lines, fuel lines, etc.) are present within the boundaries of the proposed work area.

d) As the excavation work approaches the location of any known utilities, the lines must be uncovered, using extreme caution not to disturb the lines, and adequate measures must be taken to protect the lines from damage while the work progresses.

e) All utilities known but not identified must be exposed by hand.

f) Any personnel at the edge of a well, pit, shaft, and similar excavation six (6) feet or more in depth must be protected from falling by guardrail systems, barricades, or covers.

g) Where a guardrail system or barricade is infeasible, use of personal fall arrest systems are required.

h) Pier Drilling equipment must remain barricaded at all times and NOT be operated in occupied school areas.

i) Any disturbed areas must be returned to existing and safe condition prior to departure.

j) If the Contractor must make a cut, cavity, trench, or depression in the Earth's surface formed by earth removal, it must comply with the applicable OSHA Regulations.

k) General Contractors must train, or require to be trained, those employees who will work in and around the pier drilling operation about the hazards, as required by OSHA, in the areas of daily inspections, soil testing, soil classifications, and protective or support systems.

6.18 Pier Drilling Safe Plan of Action (SPA)

A Pier Drilling Safe Plan of Action (SPA) is a site-specific comprehensive Pier Drilling Program which outlines what methods, procedures, and utility strike prevention efforts will be used in its program. This evaluation and program must be in writing and must be submitted to the Owner's Representative prior to any Pier Drilling work. Review and acceptance by the General Contractor Safety Manager is required prior to submission and the start of work.

a) When working adjacent to any Pier six (6) feet in depth or greater, an appropriate means of fall protection must be provided.
b) General Contractor must coordinate and conduct an on-site Pier Drilling SPA pre-work meeting one week prior to any planned pier drilling. The Cover Letter (EXHIBIT F) must be submitted along with a Safe Plan of Action (SPA). The safety plan must be evaluated and approved by the General Contractor Safety Manager prior to submission.
c) The Pier Drilling SPA pre-work meeting agenda must include discussion about the scope and review of the existing underground utilities as it relates to the planned pier drilling operation. At the pre-work meeting, the General Contractor must present a contingency plan regarding any utility struck during the pier drilling of such work.
d) To hold a Pier Drilling SPA pre-work meeting, at a minimum, the following parties must be present:
    (1) Sub-Contractor Competent Person
    (2) General Contractor Safety Representative
    (3) Owner's Representative [Optional]

6.19 Locating Utilities

Prior to any underground work being performed, all utilities within the area of work must be located. Safety representative must ensure that Texas811 (1-800-344-8377) has been notified, and Ground Penetrating Radar (GPR) **and** review of exiting plans is be performed as part of the underground utility locating methods and a confirmation number has been issued prior to any excavation.

a) The General Contractor must coordinate with the Program Manager Network or the Architect to have all utilities within the area of work located.
b) The contract specifications and drawings must be reviewed by the General Contractor for notations of utility companies that may not be a member of an underground service alert group. Those not members of an underground service alert group must be contacted directly.
c) All calls to the utility companies must be logged and retained by the General Contractor.
d) The General Contractor must visually check the area for signs indicating the possibility of recent underground relocation work by an outside entity.
e) The General Contractor must take all necessary steps to protect the utilities from damage.
f) Ground penetrating radar (GPR) must be performed as part of the underground utility locating methods prior to any excavation activity.

g) GPR reports must include an Underground Utility Location Survey or Utility Map which shows the positioning and identification of underground utilities in relation to any planned excavation activity.

h) "Potholing" and/or hand digging must be required within three (3) horizontal feet of "located" centerlines, and in areas where knowledge is lacking, prior to any planned excavation activity.

6.20 Utility and Electrical Shutdowns

Prior to any type of shutdown, re-energizing, re-pressurizing, or tie-in activities, the General Contractor is responsible for completing the Shutdown Notification Guidelines as outlined in Attachment V, along with the applicable safety submittal requirements outlines in this section.

a) The General Contractor or Subcontractor of any tier must at no time perform any type of power or other utility shutdown activities during regular school hours. Shutdowns are to be scheduled during weekends or extended breaks.

b) **10-Day Notice of Shutdown** – General Contractor must provide Dallas ISD with notification of power or other utility shutdown no less than ten (10) calendar days in advance of the shutdown. Notification includes Dallas ISD Central Maintenance Office, A/E, Program Manager, and the Principal at each affected school.

c) Shutdown Authorization Form (EXHIBIT I) must be submitted to the Dallas ISD Bond Program Manager and Dallas ISD Project Manager for signatures of approval.

d) The General Contractor must ensure confirmation of readiness from affected Dallas ISD Departments (Including but not limited to HVAC, Kitchen, Fire Suppression, etc.) prior to any power or other utility shutdown activities.

e) When adding HVAC units, the General Contractor must notify the Project AE for approval of increased load

f) Prior to relocating any utility, Dallas ISD Sustainability Department must be notified.

6.21 Utility and Electric Shutdown Safe Plan of Action (SPA)

A Utility or Electrical Shutdown Safe Plan of Action (SPA) is a site-specific comprehensive Shutdown Program which outlines what methods, procedures, and contingency efforts will be used in its program. This evaluation and program must be in writing and must be submitted to the Owner's Representative prior to any power or other utility shutdown activities. Review and acceptance by the General Contractor Safety Manager is required prior to submission, and utility shutdown activities.

a) General Contractor must coordinate and conduct an on-site Shutdown pre-work meeting prior to any planned Utility or Electrical Shutdown. The applicable Cover Letter (EXHIBIT G **or** EXHIBIT H) must be submitted along with a Utility or Electrical Shutdown SPA. The safety plan must be evaluated and approved by the General Contractor Safety Manager prior to submission.

b) The Utility or Electrical Shutdown SPA pre-work meeting agenda must include discussion about the scope and review of any existing or potential hazards and contingency efforts as it relates to the planned shutdown.

c) To hold an Electrical or Utility Shutdown SPA pre-work meeting, at a minimum, the following parties must be present:
    (1) Sub-Contractor Competent Person
    (2) General Contractor Safety Representative
    (3) Owner's Representative [Optional]

6.22 Electrical Work

All electrical work for and throughout the course of any construction project must be provided and performed in accordance with the National Electric Code (NEC), and OSHA, 29 CFR 1926 Subpart K, 29 CFR 1926 Subpart V, NFPA 70E and NFPA 70.

a) All 120-volt single-phase 15 and 20 ampere receptacle outlets on construction sites, which are not a part of the permanent wiring of the building or structure and which are in use by employees, must have approved ground fault circuit interrupters (GFCI) for personal protection.
b) Receptacles on a two-wire single-phase portable or vehicle-mounted generator rated not more than 5 kw, when the circuit conductors are insulated from the generator frame and all other grounded surfaces, need not be protected with ground fault circuit interrupters.
c) Employees must be instructed to visually inspect each cord set, plug, and receptacle of cord sets, temporary lighting and all equipment connected by the cord and plug before each day's use for external defects and/or damage. When there is evidence of damage, the damaged item must be taken out of service, tagged until tested, and required repairs made or the item is replaced.
d) No work must not be performed on any energized electrical circuit, busbars, equipment, or panels unless an approved written work plan in accordance with NFPA 70E and submittal for review prior to performance of work. If energized work is required during commissioning, troubleshooting, and/or maintenance work must be performed under an energized electrical permit and the requirements of NFPA 70E.
e) Panel Covers must be kept in place whenever any panel is energized.
f) All Electrical Systems must be inspected and maintained on a regular basis.

6.23 Lockout/Tagout (LOTO)

A Lockout/Tagout procedure must be in place in accordance with OSHA 29 CFR 1926.417 and 1910.147 whenever performing inspections, maintenance, repairs, and modifications to equipment, machinery or electrical systems where unexpected release of energy or stored energy could create an injury. A Site LOTO log must be maintained and posted within the GC trailer and/or jobsite officing area.

Electrical box panels, even during breaks, must not be left exposed. Exposed boxes must be physically covered with the panel cover, and areas must be protected with barricades if necessary.

6.24 Electrical Power Lines

All electrical power line must be considered energized until the person owning such line or operating official of the electrical utility supplying the line assures that it is not energized, and it has been visibly grounded.

a) Operations adjacent to power lines are prohibited unless at least one of the following conditions is satisfied:
   (1) Power has been shut off and positive means taken to prevent the lines from being energized (Lock out/Tag out).
   (2) Equipment, or any part, should not have the capability of coming within the minimum clearance of energized overhead lines. As specified in OSHA Regulations, the equipment must be positioned and blocked to ensure no part, including cables, can come within the minimum clearances. A notice of the minimum required clearance must be posted at the operator's position.

6.25 Fall Prevention and Protection

General Contractors are responsible for implementing the requirements to achieve fall protection in accordance with all OSHA, Federal, State, and local regulations, this Manual, and must ensure each Subcontractor meets those requirements. A copy of this procedure must be submitted to the Owner's Representative, made part of the Contractor's Construction Project Safety Manual as, EXHIBIT J and maintained on-site.

a) All personnel regardless of craft working at a height of six (6) feet or greater above a lower level, and not protected by standard guardrails or other means must use an appropriate means of fall protection. The fall protection system selected should provide the employees the best means of protection while allowing the employees as much mobility as possible.
b) All employees working where there is a danger of falling must use approved fall protection equipment or devices. Fall protection is required.
c) The employer must prepare a written training program to ensure that each employee who might be exposed to a fall hazard is knowledgeable of the Fall Protection Program requirements. Training documentation must be retained and kept on file at the jobsite.
d) The Fall Protection Program must detail in writing when fall protection is required and exactly how this protection is to be provided. Sketches may be used to assist in the fall protection definition. This written program is required for any General Contractor or Subcontractor of any tier exposing workers to falls six (6) feet or greater above a lower level.
e) Employees must also be trained on the proper wearing, use, and limitations of personal Fall Protection and Arresting Device Systems. Training documentation must be retained and kept on file at the jobsite.
f) Fall arrest systems must be rigged such that an employee can neither free fall more than six (6) feet, nor contact any lower level.
g) Connecting two snap hooks together, as the possibility of a "roll-out" exists, must not be used to lengthen lanyards.

h) All harnesses and lanyards must be inspected frequently by the General Contractor and/or Subcontractor Competent Person. Regular inspections for wear, damage, or corrosion is a daily requirement. Damaged or defective equipment must be removed from service by the responsible Contractor or General Contractor and be destroyed to eliminate the possibility of using at a later date.

i) The employer must assure that a Competent Person, qualified in the following areas, has trained each employee as necessary:

   (1) Complete understanding of all Federal, State, and Local Fall Protection Regulations.

   (2) The nature of fall hazards in the work area.

   (3) The correct procedures for erecting, maintaining, disassembling, and inspecting fall protection systems to be used.

   (4) The use and operation of guardrail systems, personal fall arrest systems, safety net systems, warning line systems, safety monitoring systems, controlled access zones, and other protection to be used.

   (5) The role of each employee in the safety monitoring system (when this system is used).

6.26 Elevated Work Safe Plan of Action (SPA)

An Elevated Work Safe Plan of Action (SPA) is a site-specific comprehensive Fall Protection Program which outlines what methods, procedures, and equipment will be used in its program. This evaluation and program must be in writing and must be submitted to the Owner's Representative prior to any employee exposure at an elevation of six (6) feet or greater. Review and acceptance by the General Contractor Safety Manager is required prior to submission, the start of work, or employee exposure.

a) General Contractors must coordinate and conduct an on-site Elevated Work SPA pre-work meeting one week prior to any planned elevated work six (6) feet or more from a lower level. The Cover Letter (EXHIBIT J) must be submitted along with an Elevated Work SPA. The safety plan must be evaluated and approved by the General Contractor Safety Manager prior to submission.

b) The Elevated Work SPA pre-meeting agenda must include discussion about the scope and review of any existing and/or potential fall hazards as it relates to the planned elevated work.

c) To hold an Elevated Work SPA pre-work meeting, at a minimum, the following parties must be present:

   (1) Sub-Contractor Competent Person

   (2) General Contractor Safety Representative

   (3) Owner's Representative [Optional]

6.27 Roofing

No roofing work, regardless of the extent, is to be done over an occupied area. No other work will be allowed over an occupied area if it requires access to the roof. This includes, but is not limited to coring, drilling, or installation of electrical and plumbing pipe, Roof blocking, curb construction or reconstruction, flashing etc.

The intent is to restrict the activity that may cause a hazard to the occupants below. Inspections and maintenance activities are allowed as long as it does not involve significant work that might fall into the realm of the aforementioned hazard.

NOTE: An Elevated Work SPA (EXHIBIT J) may be required for roof work six (6) feet or grater in height or above a lower level.

6.28 Melting Kettles

Before firing a kettle (following the manufacturer's instructions), employees must check hoses, gauges, fuel tanks, bumpers, and other equipment for defects and make sure the lid fits tightly. Burners should not be ignited near fuel or flammable materials. All kettles must be equipped with after-burner devices.

a) Other workers who may be working on the roof should keep clear of the kettle workers and their equipment.
b) Work areas where melting kettles are in use will be barricaded off at a minimum distance of twenty-five (25) feet from other work areas.
c) No combustible materials, including insulation and bitumen, should be stored near the kettle.
d) Kettles should not be placed directly on combustible roofs. When it is necessary to place a kettle on such roofs, noncombustible surfaces must be placed under the kettle.
e) Heating devices or melting kettles should be placed on a level, firm foundation and protected against traffic, accidental tipping, or similar hazards.
f) A minimum of three (3) 20 lb. (A: B:C) dry chemical fire extinguishers must be provided for each kettle and tanker operation, each open flame torching operation, and each work crew using mechanical equipment, power tools, hot bitumen, or flammable liquids.
g) Travel distance from the kettle work area to the nearest fire extinguisher must be located within twenty-five (25) feet, on opposite sides of the kettle. These extinguishers shall be readily accessible at all times in case of an emergency.
h) Hot kettles should never be left unattended, **even during lunch periods**. The kettle covers should be readily available and fit tightly. All kettle workers should know how to put out a kettle fire.
i) Before refueling, burners and engines must be safely shut down and allowed to cool.
j) A non-combustible surface must be available on which to put a burner when removed from the kettle.
k) Enclosed areas in which hot substances are being heated or applied should be properly ventilated.

l) Hoisting equipment should be used to raise bitumen to the roof. Hot bitumen should never be carried up ladders. The hoisting equipment must be strong enough to hoist the load and be properly secured.

m) Employees must know the proper way to pick up a bucket and not jerk or kick a bucket that is stuck to a roof.

n) At the conclusion of work, roofing mops should be "fanned out" onto a noncombustible surface to minimize the chance of spontaneous ignition.

6.29 Scaffolding

The erection, alteration or moving, of any scaffolding system or work platform must be performed under the direction of a designated "Competent Person."

a) Guardrails, mid-rails, and toe-boards must be installed on all open sides of scaffolds. This guardrail system should be constructed from components furnished by the manufacturer.

b) Unauthorized personnel must not alter scaffolds or work platforms.

c) Guardrails are required for all scaffolding greater than six (6) feet in height. All employees working on scaffolds 6 ft. or higher must have adequate means of fall protection.

d) Where uplift may occur, scaffold planks must be cleated or secured and must extend over the end supports by at least 6 inches but not by more than 12 inches.

e) A competent person must visually inspect all scaffold members before each use. Damaged scaffold members must be removed from service immediately.

f) Access ladders must be provided for each scaffold in accordance with OSHA 1926.450.

g) Adequate mudsills and/or base plates or other rigid footing, capable of withstanding the maximum intended load, must be provided.

h) Scaffolds must be tied off to the building or structure at intervals in accordance with OSHA 1926.450.

i) Scaffolds must not be overloaded. Materials shall be brought up as needed. Excess materials and scrap must be removed from the scaffold when work is completed.

j) Barrels, boxes, kegs, horses, ladders, loose tile blocks, loose piles of bricks, or other unstable objects must not be used as work platforms or mounted on top of other work platforms.

k) Where persons are required to work or pass under a scaffold, a screen of 18 gauges, 1/2-inch wire mesh or equivalent protection is required between the toe boards and the guardrail.

l) Overhead protection is required if employees working on scaffolds are exposed to overhead hazards.

NOTE: An Elevated Work SPA (EXHIBIT J) may be required for scaffolding systems six (6) feet or grater in height or above a lower level.

6.30 Floor and Wall Openings

As defined by OSHA, a hole constitutes as any gap or void two (2) inches or more in its least dimension, in a floor, roof, or other walking/working surface. Hole covers must be capable of supporting without failure, at least twice the weight of employees, equipment, and materials that may be imposed on the cover at any one time.

6.30.1 General

a) All floor holes and openings into which persons can accidentally walk or fall through must be guarded by a physical barrier or cover, secured, and labeled, "HOLE COVER – DO NOT REMOVE", or protected by a standard guardrail system.

b) Wall openings, from which there is a drop of more than 6 feet, and where the bottom of the opening is less than 42 inches above the working surface, must be guarded with a top rail, mid-rail, and toe board.

c) A standard guardrail system or perimeter cable must guard every open-sided floor or platform 6 feet or more above the adjacent floor or ground level.

d) When it is necessary to work inside the barricade around a floor opening, or building edge, workers must wear and use a Personal Fall Arrest System, which must be tied off.

6.30.2 Guardrails

a) Top rails and mid-rails protecting all work areas 4 feet or more in height must be smooth surfaced throughout their length and have a vertical height of 42 inches. Midrails must be halfway between the toprails and the floor, platform, runway, or ramp. Synthetic or natural fiber ropes must not be used as top-rails or mid-rails.

b) Wire rope, when used as top-rails or mid-rails, must be free of sharp edges, burrs, or projections which may be a hazard. The maximum deflection of the top rail when a load of 200 pounds is applied in any direction at any point on the top rail must not exceed 3 inches in one direction, which includes the free hanging sag in the wire rope. Support posts must not be positioned more than eight (8) feet apart.

c) Wood top railing must be at least 2 x 4-inch stock or equivalent. Wood railing posts must be of at least 2 x 4-inch lumber spaced not to exceed 8 feet. Mid-rails must be at least 1 x 6-inch stock or equivalent. Toe boards must be 1 x 4-inch lumber or equivalent and securely fastened.

d) When materials are piled to such a height that a standard toe board does not provide protection, paneling, or screening from the floor to top-rail or mid-rails must be provided.

e) All guardrails and handrails must be inspected daily and repaired immediately, as needed.

6.31 Stairways and Ladders

6.31.1 Ladders

a) Manufactured ladders must be at minimum Type 1A rated (300lb.)

b) Portable aluminum ladders shall be prohibited.

c) All job-made wooden ladders and stairs, regardless of height, must be constructed according to OSHA and ANSI specifications.

d) Extension ladders must not exceed forty-four (44) feet in length.

e) Stepladders must not exceed twenty (20) feet in length.

f) Single cleat ladders must not exceed thirty (30) feet in length.

g) Double cleat ladder must not exceed a maximum length of twenty-four (24) feet.

h) Workers must maintain three points of contact, with the ladder, while ascending or descending and always face the ladder; Hands must be free of tools and materials.

i) Fixed Ladders: Fall protection must be provided for employees climbing or working from fixed ladders above twenty-four (24) feet. A fixed ladder is a ladder that cannot be readily moved or carried because it is an integral part of a building, structure, or scaffolding system.

6.31.2 Stairways

a) Stairs having 4 or more risers must have its sides protected by a standard handrail system.

b) All job-made wooden ladders and stairs, regardless of height, must be constructed according to OSHA and ANSI specifications.

c) On temporary stairways, for every 12 feet of vertical riser, there must be a landing platform, and:

   (1) Stairs must be at least 24 inches wide and equipped with treads and handrails.

   (2) Temporary stairs must have a 30-inch-wide landing for every 12 feet of vertical rise.

   (3) Stairs must be properly illuminated (5 footcandles).

   (4) Stairways, ramps, or ladders must be provided at all points where a break in elevation of 19 inches or more occurs in a frequently traveled passageway, entry, or exit.

d) Where permanent stairways are not installed, concurrently with the construction of each floor, a temporary stairway must be provided to the work level. Joints must be locked together by lock pins, bolts, or equivalent fastenings.

e) Handrails must be of construction similar to a standard guardrail. All handrails and railings must be provided with a clearance of approximately 3 inches between the handrail or railing and any other object.

f) Handrails must be not more than 37 inches or less than 30 inches from upper surface of handrail to surface of tread. Handrails must also be in line with the face of the riser, or to the surface of the ramp.

6.32 Crane Operations

A Crane Operations Safe Plan of Action (SPA) pre-operational meeting is required to review the appropriate lift plan prior to making any Critical lift, Major lift, or Standard lift. It should never be assumed that any member of the crew is aware of all aspects of the lift, and therefore all aspects of the lift plan should be reviewed.

a) The General Contractor must ensure that its Subcontractors meet the requirements set forth by ASME B30.5.2011 and OSHA 29 CFR Subpart CC.

b) The following documentation must be available inside of the cab, before crane is placed into service:

   (1) current monthly inspection

   (2) Manufacturer's load chart

   (3) Manufacturer's operating manual.

c) All cranes must receive regular, thorough, and periodic inspections, in accordance with the manufacturer's recommendations or applicable governing standards. All defects noted during any crane inspection must be corrected, prior to use.

d) All cranes must be used in accordance with manufacturer guidelines.

e) Cranes must never be operated in excess of its rated capacity.

f) Contractors must not use a crane to lift/lower and/or suspend personnel in man baskets or work platforms. Any exception to this rule must be cleared through the Contractor's project manager or superintendent.

g) All rigging equipment (i.e., slings, softeners, bridles, blocking cables, etc.) must be inspected prior to use and documented monthly.

h) The General Contractor must ensure that crane and wire rope inspections are performed and that daily, monthly, quarterly, and annual logs are maintained. Crane Inspection Record is included as EXHIBIT K (equivalent form(s) may be utilized).

i) All rigging must be kept in good condition, working load limit capacities properly identified, and properly stored when not in use.

j) All Rigging work must only be done by qualified riggers.

k) Booms and/or suspended loads must not be allowed to pass over playground or other school property when students and/or staff are present in these areas.

l) Safety hooks must be used on all operations where loads are being handled.

m) All suspended loads must be controlled by tag lines of enough length to control the load.

n) All signal persons must:

   (1) Receive proper signaling training.

   (2) Never allow a suspended load to pass over or come within ten (10) feet of power lines.

   (3) Never allow a suspended load to pass over, nor any individual to pass under, a suspended load.

   (4) Be in constant view and communication with the crane operator. Constant communications include proper hand signals and/or radio communications.

(5) Make daily general inspections of the crane prior to use and maintain a log of these inspections. The Operator, or other qualified person may also conduct the daily inspection.

o) All crane operators must:
   (1) Be thoroughly trained and must have related experience,
   (2) Be familiar with safe crane practices and procedures.
   (3) Have a complete understanding of all manuals, including maintenance and operating instructions provided for the specific crane in use.
   (4) Have no physical, visual, or mental reactions or impairments that will affect the safe operations of the assigned crane.

p) The crane operator and crew must not engage in any practice such as cell phone usage during crane operations that could divert their attention.

q) For all Dallas ISD property that lies within an Airport Control Zone (within 5 miles of any airport) the General Contractor will ensure that the crane's boom lighting, flagging, raising, and lowering comply with FFA rules.

r) To provide clearance for air traffic, all booms must be below 175 feet above ground level (AGL) during the hours of sunset to sunrise. However, if this is not possible and temporary construction cranes are left up during this time period or utilized in support of construction activities, then all cranes must have lighting in accordance with FFA Advisory Circulation 70/7460-1, "Obstruction Marking and Lighting."

6.33 Crane Operations Safe Plan of Action (SPA)

A Crane Operations Safe Plan of Action (SPA) is a site-specific comprehensive crane lift plan which outlines what methods, procedures, and equipment will be used in its plan. This evaluation and program must be in writing and must be submitted to the Owner's Representative prior to any crane activity. Review and acceptance by the General Contractor Safety Manager is required prior to submission.

a) Any changes in site conditions that could affect the safe operation of the crane must be evaluated and included within the SPA; this plan must be approved by a qualified person.

b) General Contractor must coordinate and conduct an on-site Crane Operations SPA pre-work meeting one week prior to any planned crane activity. The Cover Letter (EXHIBIT K) must be submitted along with a Crane Operations SPA. The safety plan must be evaluated and approved by the General Contractor Safety Manager prior to submission.

c) Prior to any crane activity, the General Contractor must submit, to the Bond Program Safety Director, or designee:
   (1) A copy of the crane certification and documentation of the most recent annual inspection prior to crane use.
   (2) Crane certificate of insurance
   (3) A copy of the annual crane inspection as well as current maintenance reports.
   (4) Crane Operator certification
   (5) Crane Operator medical card

(6) Crane Location plan that identifies known hazards for underground and overhead crane operations, and where the crane is approved or not approved to operate.

(7) Any changes in site conditions that could affect the safe operation of the crane; this plan must be approved by a qualified person.

(8) Rigger and/or Signal Person's training records

(9) Job Hazard Analysis

d) To hold a Crane Operations SPA pre-work meeting, at a minimum, the following parties must be present:

(1) Sub-Contractor Competent Person

(2) General Contractor Safety Representative

(3) Owner's Representative [Optional]

6.34 Steel Erection

Structural stability must be maintained at all times during the steel erection process. The General Contractor must ensure the establishment of a written Steel Erection Procedure that adheres to OSHA, Federal, State, and local regulations. A copy of this procedure must be submitted to the Owner's Representative, made part of the Contractor's Construction Project Safety Manual as EXHIBIT L, and maintained on-site.

6.34.1 Site Layout and Construction Sequence

General Contractors must provide erectors with a site layout/map which includes, but is not limited to:

(1) Pre-planned routes for hoisting loads

(2) Pre-planned routes for delivering material, equipment, etc.

(3) Material staging area(s)

(4) Known hazards that may affect underground and/or overhead operations.

6.34.2 Structural Steel Assembly

In addition to the items listed in this section, all contractors of any tier must comply with all federal, state, and local requirements, including those in other sections of this safety manual. All contactors must be required to comply with all parts of these requirements based on their scope of work.

a) Contractors of any tier must not erect steel until receiving a written certification of proper curing of the concrete in the footings, piers, walls, etc. is of sufficient strength to support the loads imposed during steel erection.

b) Prior to the erection of any column, the General Contractor must provide written notification to the steel erector if there has been any repair, replacement, or modification of the anchor rods (anchor bolts) of that column.

6.34.3 Hoisting and Rigging

Contractors of any tier must use qualified riggers during hoisting activities for assembly and disassembly work (29 CFR 1926.1404(r)(1)). Additionally, qualified riggers are required

whenever workers are within the fall zone and hooking, unhooking, or guiding a load, or doing the initial connection of a load to a component or structure (29 CFR 1926.1425(c)).

a) All Rigging and Signal person(s) must be properly trained in accordance with all Federal, State, and local regulations.
b) Free rigging is the practice of attaching ropes, chains, or slings to a telehandler/forklift tine(s) for the purpose of lifting and moving. Free rigging must not be permitted without the telehandler/forklift manufacturer's letter of approval.
c) Exposure to overhead loads must be minimized through pre-planned routes for hoisting loads and/or other contracting personnel who may be transiting the jobsite.
d) Any procedure(s) for multiple rigging lifts (Christmas-treeing) is prohibited.
e) General Contractors must pre-plan site-specific work practices regarding safely landing loads while maintaining proper protection from fall hazards.

6.34.4 Column Anchorage and Double Connections

Columns must be set on level finished floors, pre-grouted leveling plates, leveling nuts, or shim packs which are adequate to transfer the construction loads.

a) All columns must be evaluated by a competent person to determine whether guying or bracing is needed; if guying or bracing is needed, it must be installed.
b) All columns must be anchored by a minimum of 4 anchor rods (anchor bolts).
c) Anchor rods (anchor bolts) must not be repaired, replaced, or field-modified without the approval of the project structural engineer of record.
d) When two structural members on opposite sides of a column web, or a beam web over a column, are connected sharing common connection holes, at least one bolt with its wrench-tight nut must remain connected to the first member unless a shop-attached or field-attached seat or equivalent connection device is supplied with the member to secure the first member and prevent the column from being displaced (See Appendix H of 29 CFR 1926 subpart R for examples of equivalent connection devices).

6.34.5 Falling Object Protection

a) All materials, equipment, and tools, which are not in use while aloft, must be secured against accidental displacement.
b) The General Contractor must bar any construction processes below steel erection activities unless overhead protection for the employees below is provided.

6.34.6 Fall Protection

Each employee engaged in any steel erection activity who is on a walking/working surface with an unprotected side or edge more than six (6) feet above a lower level must be protected from fall hazards by guardrail systems, safety net systems, personal fall arrest systems, positioning device systems, or fall restraint systems.

a) A safety railing of 1/4-inch wire rope, or equal, must be installed approximately 42 inches high, around the periphery of a temporary planked or metal deck floor during structural steel erection. This wire rope must be flagged every six (6) feet.

b) Wire rope should be securely fastened yet allow for temporary removal in order to land materials.

6.34.7 Controlled Decking Zone (CDZ)

A controlled decking zone may be established in the area of the structure over fifteen (15) feet and up to thirty (30) feet above a lower level where metal decking is initially being installed and forms the leading edge of a work area. In each CDZ, the following must apply:

a) Each employee working at the leading edge within a CDZ must be protected from fall hazards six (6) feet or greater above a lower level.
b) Access to a CDZ must be limited to only those employees engaged in leading edge work.
c) The boundaries of a CDZ must be designated and clearly marked. The CDZ must not be more than ninety (90) feet wide and ninety (90) feet deep from any leading edge. The CDZ must be marked by the use of control lines or the equivalent. (Examples of acceptable procedures for demarcating CDZ's can be found in Appendix D of 29 CRF 1926 subpart R).
d) Each employee working in a CDZ must have completed CDZ training in accordance with 29 CFR 1926.761.
e) Unsecured decking in a CDZ must not exceed three thousand (3,000) square feet.
f) Safety deck attachments must be performed in the CDZ from the leading edge back to the control line and must have at least two attachments for each metal decking panel.
g) Final deck attachments and installation of shear connectors must not be performed in the CDZ.

6.34.8 Training

Each employee engaged in any steel erection activity who is on a walking/working surface with an unprotected side or edge more than six (6) feet above a lower level must be trained and instructed, but not limited to, the following areas:

a) Have completed connector training in accordance with 29 CFR 1926.761
b) Each employee working in a CDZ must have completed CDZ training in accordance with 29 CFR 1926.761.
c) The recognition and identification of fall hazards in the work area.
d) The use and operation of protective systems, such as guardrail systems, personal fall-arrest systems, positioning-device systems, fall- restraint systems, safety-net systems, and other protection to be used.
e) The correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems to be used.
f) Procedures for protection from falls to lower levels and into holes and openings in walking/working surfaces and walls.

6.35 Steel Erection Safe Plan of Action (SPA)

A Steel Erection Safe Plan of Action (SPA) is a comprehensive site-specific steel erection plan which outlines key erection elements such as methods, procedures, and equipment that will be utilized during all phases of the steel erection operation. This evaluation and plan must be in writing and must be submitted to the Owner's Representative prior to any steel erection activity. Review and acceptance by the General Contractor Safety Manager is required prior to submission, the start of work, or any employee engagement with this activity.

a) General Contractors must coordinate and conduct an on-site Steel Erection SPA pre-work meeting one week prior to any engagement of steel erection activities. The Cover Letter (EXHIBIT L) must be submitted along with a Steel Erection SPA. The safety plan must be evaluated and approved by the General Contractor Safety Manager prior to submission.
b) The Steel Erection SPA pre-meeting agenda must include discussion about the scope and review of any existing and/or potential hazards as it relates to the planned scope of work.
c) To hold a Steel Erection SPA pre-work meeting, at a minimum, the following parties must be present:
    (1) Sub-Contractor Competent Person
    (2) General Contractor Safety Representative
    (3) Owner's Representative [Optional]

6.36 Aerial Crane Operations

The General Contractor must ensure the establishment of a written Aerial Crane Procedure that adheres to all applicable regulations of the Federal Aviation Administration (FAA) 14 CFR – Part 77, and the Occupational Safety and Health Administration (OSHA) 29 CFR 1926.551 – Subpart N, in addition to applicable State and local regulations. A copy of this procedure must be submitted to the Owner's Representative, made part of the Contractor's Construction Project Safety Manual as EXHIBIT M, and maintained on-site.

Every precaution must be taken to provide protection against flying objects in the rotor downwash. All loose objects within one hundred (100) feet of any areas susceptible to rotor downwash must be secured or removed prior to any Aerial Crane Lift.

a) Aerial Crane Operations must not be performed during regular school hours or near occupied areas.
b) No unauthorized person(s) must be allowed to approach within fifty (50) feet of the helicopter when the rotor blades are turning.
c) Open flames, hot work, or any other spark producing activities must not be permitted in an area that could result in fires being spread by the rotor downwash.
d) Ground personnel must be properly trained when required for safe helicopter loading and unloading operations.
e) Constant reliable communication must be provided between the pilot, and a designated employee of the ground crew who acts as a signalman during the period of loading and unloading. This signalman must be distinctly recognizable from other ground personnel.

f) When visibility is reduced by dust or other conditions, ground personnel must exercise special caution to keep clear of main and stabilizing rotors. Precautions must also be taken by the General Contractor to eliminate any conditions of reduced visibility.

g) Personal protective equipment for ground persons receiving the load shall consist of complete eye protection and hard hats secured by chinstraps.

h) The helicopter operator is responsible for size, weight, and manner in which loads are connected to the helicopter. If, for any reason, the helicopter operator believes the lift cannot be made safely, the lift shall not be made. The weight of any external load must not exceed the manufacturer's rating.

i) When Contractors are required to perform work under hovering craft, a safe means of access must be provided for workers to reach the hoist line hook and engage or disengage cargo slings. Employees must not perform work under hovering craft except when necessary to hook or unhook loads.

j) Static charge on the suspended load shall be dissipated with a grounding device before ground personnel touch the suspended load, or protective rubber gloves must be worn by all ground personnel touching the suspended load.

k) Loads shall be properly slung, and tag lines shall be of a length that will not cause them to be drawn up into rotors.

l) Electrically operated cargo hooks must have the electrical activating device designed and installed to prevent inadvertent operation. In addition, these cargo hooks must be equipped with an emergency mechanical control for releasing the load. The hooks must be tested prior to each day's operation to determine that the release functions properly, both electrically and mechanically.

6.37 Aerial Crane Operations Safe Plan of Action (SPA)

An Aerial Crane Operations Safe Plan of Action (SPA) is a site-specific comprehensive aerial lift plan which outlines what methods, procedures, and equipment will be used in its plan. This evaluation and program must be in writing and must be submitted to the Owner's Representative prior to any aerial crane activity. Review and acceptance by the General Contractor Safety Manager is required prior to submission.

a) Any changes in site conditions that could affect the safe operation of the aerial lift must be evaluated and included within the SPA. This plan must be approved by a qualified person.

b) General Contractor must coordinate and conduct an on-site Aerial Crane Operations SPA pre-work meeting one week prior to any planned crane activity. The Cover Letter (EXHIBIT M) must be submitted along with a Crane Operations SPA. The safety plan must be evaluated and approved by the General Contractor Safety Manager prior to submission.

c) This briefing shall set forth the plan of operation for the pilot and ground personnel. A copy of this procedure must be made part of the Contractor's Construction Project Safety Manual as EXHIBIT M and maintained on-site.

d) Prior to any aerial crane activity, the General Contractor must submit, to the Dallas ISD PM and Bond Program Safety Manager the following minimum elements of an Aerial Crane Operations SPA:
    (1) Lift Plan (scope of work, travel path, ground level and ariel hazards or obstructions)
    (2) Site Set-Up (map of staging areas, sequence of operation, primary and alternate emergency area locations, and potential drop zones in relation to occupied areas)
    (3) Material to be lifted (method of attachment, rigging to be used, configuration, and load capacities)
    (4) Roles and responsibilities (communication methods for ground crew, roof crew, and operator)
    (5) Competent Person Designation form (must identify areas of competency along with proof of training)
    (6) Rigger and signal person training records
    (7) JHA (include hazard assessment, equipment, and PPE needed to safely perform this task)
    (8) Emergency Action Plan (including emergency contact information and medical facility)
    (9) Standard Airworthiness Certificate
    (10) Congested Area Plan Request to FAA
    (11) FAA Registry of Aircraft
    (12) FAA Airman Detail Report
    (13) Notification of Dallas City Officials
    (14) Certificate of Aircraft liability insurance (insurance limit must be $10 million, per contract amount)
    (15) Evidence of additional insured and waiver of subrogation endorsement

e) To hold an Aerial Crane Operations SPA pre-work meeting, at a minimum, the following parties must be present:
    (1) Sub-Contractor Competent Person
    (2) General Contractor Safety Representative
    (3) Owner's Representative [Optional]

NOTE: The District's Safety Department must receive acceptance of Certificate of Insurance (COI) from the District's insurer prior to any Aerial Crane Activity.

6.38 Hot Work

All work that includes an open flame, burning, welding, or spark producing of any type must be defined as "hot work" and must require the presence of a fire extinguisher, at least one fire watch, and a Hot Work Permit.

6.38.1 General

In addition to strictly following the provisions of OSHA and NFPA, each Contractor must also comply with the following:

a) No hot work must be conducted during occupied hours
b) A Hot Work Permit issued by the Fire Marshal must be Posted within the General Contractor's trailer or on-site officing area.
c) A Hot Work Permit must be completed for each task using EXHIBIT N or equivalent.
d) Fire extinguisher(s) used for "Hot Work" must be placed within this immediate vicinity of each task operation and must be of proper size and type for the activity, fully charged, and inspected prior to use. Extinguisher location must be kept clear and accessible at all times.
e) A fire watch must be present during all hot work operations and remain at the work area 30 minutes after work is completed. All fire watch personnel must be trained in fire extinguisher safety.

6.39 Welding and Cutting

a) All welding operations must provide appropriate screening measures, erected in advance, to contain the high energy light. Welding operations must not be allowed to present an opportunity for flash burn exposures to the eyes of any workers in the vicinity.
b) Shielding, or welding curtains must be placed around established work areas to protect other workers from flash and sparks.
c) Ventilation must be provided to adequately remove harmful fumes and gasses.
d) The unused stubs of welding electrodes "rod butts" must be collected and placed in proper disposal containers as soon as each one is expended. Whenever an operation is idle, the welding electrode must be removed from stinger/electrode holder.
e) Workers must receive training on the proper use, inspection, and limitations of all welding and cutting equipment and Personal Protective Equipment, as it pertains to the operation.
f) Regulators for fuel gas and oxygen cylinders must be inspected before each use and be maintained in good working order.
g) Anti-flashback arrestors must be properly installed on all cutting torches so that they prevent ignition of any gas sources upstream from the torch.
h) Acetylene cylinder valve key must be kept with the cylinder at all times. Valve keys must be kept in position while in use.

6.40 Compressed Gas Cylinders

Contractor must store oxygen cylinders separate from fuel gas cylinders. This separation must be either a minimum distance of 20 feet or by a fire resistive wall/partition with a one-half hour fire rating and a minimum of five (5) feet in height. All compressed gas cylinders must be properly secured from movement – in an upright (vertical) position.

a) All cylinders must be stored in the upright position, especially acetylene. When an acetylene cylinder is stored on its side, the acetylene may separate from the acetone, becoming unstable, and cause an internal explosion.
b) Valves of the empty cylinders must be in the closed position.
c) Cylinders must not be moved by tilting and rolling them on their bottom edges.
d) When not in use, cylinders must have their protective caps in place and be hand tightened.
e) Workers must be trained in the safe handling, storage and use of compressed gas cylinders.
f) Workers must be trained in the proper use and handling of fuel gas and O2 cylinders

6.41 Earth Moving Equipment and Powered Industrial Trucks

A Powered Industrial Truck (PIT) is defined by any mobile, power-pulled truck used to carry, push, pull, lift, stack, or tier materials, whether ridden by the operator or controlled by a walking operator.

a) All earth moving equipment and PIT must be maintained in a safe working condition and must be appropriate and adequate for the intended use. Excavation activities must not be conducted during occupied hours.
b) Only authorized personnel must operate equipment. Operators of equipment, machinery, vehicles, or PIT must be qualified and properly authorized for the operation involved.
c) Equipment and PIT operators must perform a pre-shift walk around safety inspection of their equipment, and any conditions that may affect safe operation will be corrected before use.
d) Equipment must not be operated unless all required safety devices are in place and functioning properly.
e) Careless, reckless, or otherwise unsafe operation or use of equipment must result in discipline and may constitute grounds for dismissal.
f) Equipment maintenance is to be performed only by qualified mechanics.
g) When equipment is serviced or repaired the operator must dismount until the service or repair is completed. Prior to remounting, operators must perform a complete walk-around safety inspection of the equipment.
h) Before performing any service or repair work, all equipment must:
    (1) Be stopped and positively secured against movement or operation.
    (2) locked and tagged out of service, unless it is designed to be serviced while running, following the manufacturer's instructions.

i) All bi-directional earth moving equipment, PIT, and motor vehicles with an obstructed view to the rear must be equipped with a warning horn and an automatic back-up (reverse) alarm that can be heard above and distinguished from the surrounding noise level.

j) All off-highway earth moving equipment and trucks such as loaders, dozers, scrapers, motor graders, rock trucks, tractors, rollers, and compactors will be equipped with roll-overprotective structures (ROPS) and seat belts, per OSHA standards.

k) Seat safety belts, when required by the manufacturer, must be used by all operators of equipment.

l) Mobile equipment must not be left unattended unless parked securely to prevent movement, with all ground engaging tools lowered to the ground, brakes set, and the engine off.

m) Equipment parked at night will be illuminated, barricaded, or otherwise clearly marked where exposed to potential traffic.

n) Personnel must not be transported or ride on any equipment or vehicles that are not equipped with seats for passengers.

o) When fueling equipment or vehicles with gasoline or liquefied petroleum gas (LPG) the engine must be shut off.

p) All equipment and vehicles must be equipped with appropriate fire extinguishers or fire suppression system.

q) Equipment, tools, and materials hauled on pickups and flatbed trucks must be secured to prevent them from falling onto the road.

6.42 Haul Routes

Haul roads must be designed, constructed, and maintained for safe operation consistent with the type of haulage equipment in use. Standard traffic control signs must be used where necessary.

a) Elevated roadways must have axle high beams or guards maintained on their outer banks.

b) Equipment, pickups, and passenger vehicles must be parked well away from the work area to reduce congestion and avoid collision.

c) Vehicle and equipment speed limit while traversing school property must be a maximum of five (5) miles per hour during school hours and/or when children are present.

6.43 Traffic Control

a) All General Contractors, Subcontractors, and employees must comply with local city ordinances when work interfaces with traffic of the general public.

b) Vehicle and equipment speed limit while traversing school property must be a maximum of five (5) miles per hour during school hours and/or when children are present.

c) All materials and equipment deliveries should be coordinated with General Contractors as to prevent traffic congestion around peak school hours for children being dropped off or picked up from school.

6.44 Environmental and Hygiene

General Contractors and Subcontractors of any tier must comply with all applicable federal, state, and local statutes, laws, rules, regulations, ordinances, codes, and any amendments relating to the environment, hazardous substances or exposure to hazardous substances, including without limitation the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), the Superfund Amendments and Reauthorization Act of 1986 (SARA), the Hazardous Material Transportation Act (HMT A), Resource Conservation and Recovery Act (RCRA), the Toxic Substances Control Act (TSCA), the Clean Water Act (CWA), the Clean Air Act (CAA), the Oil Pollution Act (OPA) and the Safe Drinking Water Act (SDW A).

The General Contractor is responsible for the implementation and management of its Storm Water Pollution Prevention Plan (SWPPP) and SWPPP Oversight as Attachment VI of this manual.

Where necessary, The General Contractor must provide, and the General Contractor's Safety Representatives must be trained and capable of, properly operating industrial hygiene equipment as required by any Federal, State, and local regulations. Tests must be performed as often as necessary to afford protection to employees and the general public.

6.45 Spill Prevention and Response

When utilizing hazardous and non-hazardous substances that could cause a negative impact when released on land, water, and\or the atmosphere, the General Contractor must exercise extreme caution by developing and implementing a site-specific spill prevention and spill response procedure in accordance with OSHA, Federal, State, and local regulations.

No Contractor must omit or discharge any substance into the environment in violation of the Environmental Protection Agency (EPA), OSHA or other regulatory agencies. Where necessary, the General Contractor's Safety Representative must be responsible for all environmental monitoring and testing.

6.46 Portable Relocation

Prior to commencement of work, the Controlling Contractor is responsible for obtaining the Disconnection Form provided by the Moving Contractor for each portable to be relocated. The Controlling Contractor must provide a completed copy of the Disconnection Form along with applicable safety submittal documentation to the Owner’s Representative prior any relocation, demolition, or disconnection of portables.

a) The relocation of portables must be coordinated around peak hours of school traffic, i.e., morning drop off of children and afternoon pick-ups.
b) All relocation activities (including haul routes) must remain properly separated from occupied areas. Barriers for outdoor areas affected by construction must consist of six (6) foot chain link fencing.
c) Haul routes must be designed, constructed, and maintained for safe operation consistent with the type of haulage equipment in use. Standard traffic control signs must be used where necessary.

d) Equipment, pickups, and passenger vehicles must be parked well away from the work area to reduce congestion and avoid collision.
e) Vehicle and equipment speed limit while traversing school property must be a maximum of five (5) miles per hour during school hours and/or when children are present.
f) The Moving Contractor and/or General Contractor must field verify the safe relocation of portables from site "A" to site "B" and inspect the safe passage of established haul routes.
g) portable classrooms and ADA approved ramps, decks, steps, etc. must meet the specifications contained in the RFP, Contract Award Doc, and applicable Federal, State, and local requirements.

NOTE: Contractors are responsible for submitting moving permit applications to the City and are responsible for communication with the city of Dallas to resolve all action items related to the moving permit.

7. INCIDENT NOTIFICATION GUIDELINES

The District's objective is an injury and incident-free project, with a focus on project safety that must not be compromised to achieve any other business objective. The General Contractor must structure an effective and systematic safety management approach that emphasizes **continuous safety process improvement.**

The District recognizes that the General Contractor and Subcontractors may have existing safety management programs with established safety policies, processes, procedures, and work practices. The District will support these where they prove to be as effective and meet the intent and purpose of this Section.

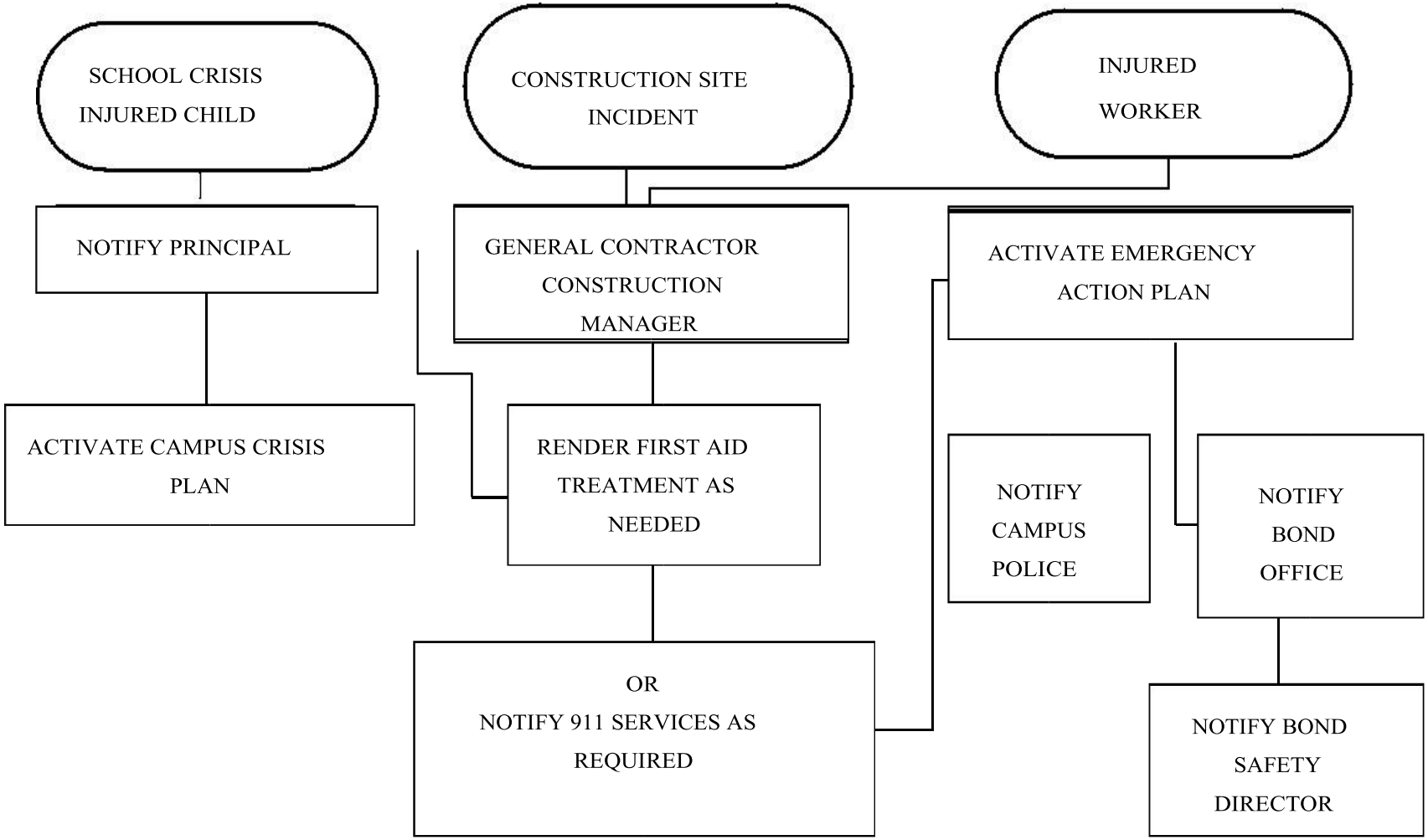
a) General Contractors and Subcontractors of any tier must instruct all workers to immediately report every incident to their supervisor, even if there is no obvious injury or property damage. Supervisors must immediately notify the General Contractor, who must immediately notify the Owner's Representative of any incident.
b) The Bond Program Safety Manager and others as directed must be included in the incident notification process. Depending on potential severity of the incident, notifications may be in written and/or verbal form as directed.
c) Upon request of the Owner's Representative, the General Contractor and/or Subcontractors of any tier must promptly produce and provide copies of any required documents related to project safety or property damage.
d) Where opportunities for improvement are identified, the General Contractor and Subcontractors of any tier must work collaboratively with the Owner's Representative in making appropriate revisions to progress toward an injury and incident-free workplace.
e) The General Contractor's Safety Representative must generate a formal incident report using EXHIBIT O, or equivalent company accident report forms, in the manner and time as directed by the Owner's Representative.
f) The General Contractor's Safety Representative, accompanied by the Owner's Representative, must perform a site inspection immediately following any near miss,

property damage, fire, hazardous chemical spill, or accident involving construction equipment that results in injury to a worker, student, school employee, or visitor to the site.

g) Contractors must review the filed copy of the pre-construction Site-specific Safety Plan and/or Safe Plan of Action (SPA) that was performed prior to commencement of any construction activity.

[Notification Flow Chart is located on the next page]

7.1 DISD Incident/Crisis Notification Flowchart



7.2 Incident Investigations

When an accident or near miss with major potential for a loss occurs, the supervisor of the crew(s) involved must perform an accident investigation. The General Contractor and involved Subcontractors must tailor the magnitude and depth of the investigation effort to correspond to the potential, rather than the actual outcome of the incident.

a) Investigation team members must include safety personnel, project management, line management, affected workers, and consultants as the circumstances dictate. The Owner's Representatives reserves the right to participate in any incident investigation.
b) Upon request of the Owner's Representative, the General Contractor and/or Subcontractors of any tier must provide a Root Cause Analysis as outlined in Section 7.4 of this manual or its equivalent.
c) Once a root cause has been identified and recommendations for corrective action have been determined, a procedure may be implemented to prevent a similar incident from occurring again.

7.3 Incident Follow-up Guidelines

All near miss incidents, first Aid injuries, high risk safety inspection observations, and other such incidents must be investigated. The General Contractor's Safety Manager must lead the efforts and follow a structured incident investigation program that emphasizes **continuous safety process improvement.**

The General Contractor and involved Subcontractors must tailor the magnitude and depth of the investigation effort to correspond to the potential, rather than the actual outcome of the incident. The Bond Program Safety Manager and/or designee reserves the right to participate in any incident investigation.

a) Investigation team members must include, at minimum:
    (1) General Contractor and Subcontractor Safety Representatives
    (2) General Contractor and Subcontractor Project Management
    (3) Designated Competent Person (Front Line Management)
    (4) Affected workers, and consultants as the circumstances dictate.
b) The General Contractor must develop a Root Cause Analysis report that summarizes the incident, identifies the underlying contributing factor(s), determines which process element(s) failed to control the incident, determines which process element(s) will be implemented or improved, and the time needed to take sustainable corrective action(s).
c) The General Contractor must conduct and submit an incident investigation report that supports the Root Cause Analysis in the manner and time as directed by the Owner's Representative. The Bond Program Safety Manager and/or designee reserves the right to determine the acceptability of the findings.
d) The General Contractor must prepare and submit reports that will allow the Bond Program Safety Director, designee, and Subcontractors to understand findings and any planned changes to the operating procedure(s) based on those findings.

7.4 Contributing Factors to Consider

The Root Cause Analysis investigation should thoroughly address the following:

(1) Was the incident controlled and limited so that all workers and the project were made safe post-incident? If so, what was done?
(2) Explain what happened (facts and circumstances) that resulted in the incident.
(3) Are there other work areas or tasks where this type of incident could occur again?
(4) What processes were in place to prevent the incident? (Identify processes that failed)
(5) What processes could've been implemented or improved that might have prevented this incident?
(6) What processes will be improved or implemented to reduce risk of recurrence?

8. CONSTRUCTION SAFETY FOR STUDENTS

8.1 Introduction

The aim of Program Managers, General Contractors, and Subcontractors of any tier is to carry out their work activities in a safe and efficient manner to complete each project in a timely manner.

The safety of the children is of the utmost importance, and every effort must be made to see to it that in those projects that are concurrent with school activities, each job done be evaluated for child safety.

Our children are totally dependent on us to create a safe place for them to learn, study and play. Any work related or work generated condition deemed to be unsafe must be corrected immediately, because children do not see the world as we do. Children are often attracted by what is new and alien to them and will try to gain access to what may seem to be great places to play and have fun.

Therefore, it is the responsibility of everyone to control the potentially dangerous areas that exist on any construction project. All, regardless of the trades involved, must make this effort. In other words, the responsibilities of each person working in occupied areas become that much larger or expanded due to child safety conditions. Remember, it is for the children that construction is underway.

8.2 Separation of Construction Activities

Should any part of an occupied and operational school facility be shut down for construction work, then the General Contractor must erect appropriate construction barricades to completely eliminate access for non-construction personnel to the work area.

General Contractors must ensure safety inspections are conducted in all work areas regularly and periodically throughout the work shift to ensure proper elimination, mitigation, and/or safeguarding of hazards which may result as contributing factors that may lead to any exposure, injury, or property damage. **All unsafe conditions must be corrected immediately.**

a) Construction work areas must be kept segregated from school operations, staff, and students at all times. Separation may include, but is not limited to fencing, privacy fencing, bulkheads, and coordination of planned construction activities.

b) Barriers for indoor construction must be made of 3/4" plywood, and must extend from floor to ceiling, wall to wall. The temporary barrier must have a door that can be locked. This barrier will remain until work in the specified area is completely finished. Proper signage should be displayed near the temporary barrier, according to safety regulations.

c) Barriers for outdoor areas affected by construction must consist of six (6) foot chain link fencing.

d) Doors and/or gates must remain secured/closed when they open directly into occupied areas. A security service may be utilized if necessary.

e) The requirements of NFPA 101, Life Safety Code for Occupied Schools must be maintained during construction. **Separate atmospheres must be maintained between the school areas in full occupancy and the areas under construction**. Construction activities must not interfere or interrupt the normal teaching schedules.

f) Means of egress for the school occupancy must be maintained free of obstructions, clean and properly lighted. While this may be a function of the school custodian, no construction related operations must be allowed to cause an impairment of the normal means of egress.

g) All components and/or combinations of existing life safety systems (smoke detection, fire alarms, fire suppression, communication, alarm systems, intrusion control, etc.) must be maintained during construction.

h) School entrances and exits must not be blocked until school officials have been notified and re-routing has been established.

i) Appropriate warning and directional signage must be maintained at all times.

j) Dust and noise must be properly controlled to ensure the school maintains its teaching schedules without interruptions. General Contractors must respond to complaints and immediately establish control measures.

k) All deliveries (heavy equipment, tools, materials, etc.) must be coordinated around peak hours of school traffic, i.e., morning drop off of children and afternoon pick-ups.

l) Electrical box panels, even during breaks, must not be left exposed. Exposed boxes must be physically covered with the panel cover, and areas must be protected with barricades if necessary.

m) Construction debris and/or material must not be left in areas occupied by students and staff.

n) All construction debris must be removed before the end of each work shift and must not be left overnight.

o) Nails and screws must not be left protruding from lumber or other materials. All nails and screws must be removed or bent over.

p) Compressed gas cylinders must never be left unattended or overnight in occupied areas. Cylinders must remain secured in upright position; caps on and regulators disconnected when not in use.

q) Tools and equipment must not be left unattended.

9. CRISIS COMMUNICATION

A crisis is an emergency event that usually requires police, fire, or EMS response and could attract media or public attention. A crisis on a construction site might involve a fire, hazardous chemical spill, or accident involving construction equipment that results in injury to a worker, student, school employee, or visitor to the site.

a) The General Contractor must instruct all construction employees not to discuss the incident with reporters. All media inquiries must be referred to an official Dallas ISD spokesperson.

b) The Dallas ISD spokesperson must be the only person authorized to release live or pre-recorded video or written statements to the media. All Contractors of any tier must cooperate with the Dallas ISD spokesperson for all media arrangements as directed.

c) Should a crisis, serious emergency, or incident occur (requiring the presence of an ambulance, Fire Department or Police) the Contractor must immediately implement the Crisis Communication Guidelines and contact by phone the Bond Program Safety Director, **including nights, weekends, and holidays.**

9.1 Suggested Steps for Crisis Situations

(1) Evaluate the situation and extent of damage or injuries.

(2) If students are present, immediately contact the principal or school office.

(3) Call **9-1-1** if necessary. Be prepared to give the dispatcher details of the accident and injuries, the exact address and where emergency crews should enter the site.

(4) Assign someone to meet emergency crews at the gate.

(5) Call Dallas ISD Communications at **(972) 925-3917**. Be prepared to provide as much information as possible.

(6) Call Dallas ISD Police at **(214) 932-5627**.

(7) Call Construction Services at **(972) 925-7200**.

(8) Call the Safety Manager at **(214) 435-2204**.

(9) Do not speak to reporters or photographers. Refer them to Dallas ISD Communications.

9.2 EMERGENCY TELEPHONE NUMBERS

Dallas ISD Police	DISD Police	(214) 932-5627
District Spokesperson	Robyn Harris	(972) 925-3917
DISD Bond Safety Manager	Alvaro Meza	(214) 435-2204

9.3 Emergency Planning

On a regular basis, the General Contractor must review and update, when necessary, its Emergency Procedures for maximum effectiveness.

The updated procedures must be submitted to the Owner's Representative for review in accordance with the safety guidelines outlined in this manual and all applicable OSHA, Federal, State, and local regulations and maintained on-site.

The following provisions must be included in the emergency procedure:

a) The highest-ranking supervisor automatically becomes responsible for handling any emergency that occurs during working hours and may call upon the assistance of any available employee.
b) Following an emergency, ranking personnel must:
    (1) Secure the area as expediently as possible.
    (2) Provide access and an account of the emergency to authorized representatives of the District and specific government agencies. Questions from the media must be referred to the Dallas ISD spokesperson.
c) To ensure prompt emergency services, the General Contractor must:
    (1) Determine who is responsible for making emergency calls (preferably the highest-ranking supervisor present).
    (2) Conspicuously post a list of emergency phone numbers, along with information to be transmitted.

10. CONTRACTOR SAFETY AUDITS

10.1 Purpose

The effectiveness of this program depends upon the active participation and cooperation of all Engineers, Project Managers, Inspectors, Supervisors and General Contractors, their employees, and Subcontractors. The primary goals of this program are to increase safety awareness, raise safety standards in the work environment, provide incentives to make the workplace safer, and increase management involvement in the safety process.

General Contractors must ensure safety inspections are conducted in all work areas regularly and periodically throughout the work shift to ensure proper elimination, mitigation, and/or safeguarding of hazards which may result as contributing factors that may lead to any exposure, injury, or property damage. **All unsafe conditions must be corrected immediately.**

10.2 Jobsite Safety Inspections

a) The General Contractor must ensure that its Safety Representative conducts inspections of the project as needed (including storage areas, office areas, barriers, separation of activities, work areas, etc.) to ensure compliance with the District and OSHA requirements.
b) Contractors may utilize the Construction Safety Inspection Checklist EXHIBIT P, or its equivalent. Safety deficiencies that are noted during the inspection must be recorded on

the form and those deficient items must be communicated to his/her project manager/superintendent in a timely manner.

c) The project manager and/or superintendent must be responsible for implementing corrective action.

d) The General Contractor's Safety Representative will follow up and note the status of each safety deficiency until the deficiency has been abated, but until abatement takes place, each previously noted deficiency should be recorded during each subsequent site inspection.

e) In addition to performing jobsite safety inspections, the General Contractor's Safety Representative must cooperate with designated District Representatives who conduct jobsite inspections (i.e., Insurance Carrier Loss Control personnel).

10.3 Inspections by Regulatory Agencies

The General Contractor must immediately notify the Owner's Representative of the arrival of any representative of a Regulatory Agency (OSHA Compliance Officer, TCEQ Representative, Law Enforcement Officer, etc.), and provide the Owner's Representative with a copy of any published findings or citations issued to any employer and must ensure that statutory posting requirements are met. The General Contractor must provide the Owner's Representative with a copy of any employer's response to the same findings or citations. No Contractor of any tier must prohibit the entry of an OSHA Compliance Officer onto Dallas ISD property.

11. GREENFIELD PROJECTS

Greenfield Project must refer to as any DISD property that does not have students and/or Staff present during the duration of the Project. If, during the project, staff or students are present or any District/school operation is active, it is not considered a Greenfield job site.

Property must refer to all land owned by the District, to all property thereon; buildings, structures, facilities, platforms, fixtures, tunnels, installations, and to all project vehicles, stationary or mobile equipment, whether owned or leased. This definition may also include other work locations while in the scope and course of employment on the District's Construction Projects.

Worker must refer to any employee or agent included as example, but not by way of limitation, persons providing services on the project including all persons or entities performing all or part of the services the General Contractor has undertaken to perform on the project regardless of whether that person has employees. This includes, without limitation, independent contractors, Subcontractors, owner-operators, employees of any such entity, or employees of any entity that furnishes persons to provide services on the project.

11.1 Greenfield Shutdown Guidelines

Prior to conducting any type of permanent or temporary shutdown, the General Contractor is responsible for completing the Greenfield Utility Authorization Request Guidelines as outlined in Attachment VII, along with the applicable safety submittal requirements outlined in section 6.15 of this manual.

11.1.1 Permanent Utility Shutdown Guidelines

(1) **10-Day Notice of Shutdown** – The General Contractor must provide Dallas ISD with notification of power or other utility shutdown no less than ten (10) calendar days in advance of shutdown.

(2) The General Contractor must select "**Permanent**" on the top right portion of the Shutdown Authorization Form (EXHIBIT I) prior to submitting for approval (See Attachment VII for reference).

(3) The General Contractor is responsible for providing power for the duration of the project.

(4) Once the project reaches substantial completion, the General Contractor and PMF representative must provide the Dallas ISD Sustainability Department with a copy of the General Contractor's utility bills for transfer of the utility service to Dallas ISD. Should Contractors have questions regarding this process, please reach out to the Dallas ISD Sustainability Department via email at: sg9453@dallasisd.org

NOTE: Before demolishing a portable and/or building, all meter numbers must be provided to the DISD sustainability department to close the account and have meters removed through the Owner provider. It is important ALL Utility Accounts are closed through sustainability to prevent the General Contractor from reimbursing the District. DISD is not responsible for providing General Contractors with utilities at Greenfield Project locations.

11.2 Greenfield Badging

Personnel who are issued a Greenfield Job Site Identification Badge are authorized to work on Greenfield Project **Sites until seven (7) days prior to substantial completion of the project or project site commencing operations** (no longer a Greenfield Project Site), whichever comes first. All other requirements for Non-Greenfield Project Sites (sites where district operations are on-going, or students/staff present) remain in effect.

a) General Contractors must issue/provide all workers with a Greenfield Identification Badge, along with a site-specific safety orientation prior to conducting any construction activity.

b) General Contractors must issue identification badges, at their own expense, for all workers on DISD Greenfield Project Sites.

c) Workers must wear the General Contractor issued identification badge at all times while on DISD Greenfield Project Sites.

d) Greenfield Project Site Identification Badge Requirements: Greenfield Identification Badges issued by the General Contractor must be issued by Dallas ISD's approved third-party badging vendor. Badges must contain the following information:

(1) The issuing/authorizing General Contractor's company logo in lieu of the DISD logo

(2) The issuing/authorizing General Contractor's company name

(3) The authorized Subcontractor or Vendor's company name
(4) The name of the specific project site authorized to work at
(5) A photograph and name of the authorized employee receiving the badge
(6) Badges must be labeled "Greenfield"

12. UNMANNED AIRCRAFT SYSTEM (DRONE) POLICY

The purpose of this Unmanned Aircraft System (UAS) Policy is to establish minimum standards for the safe use and operation of UAS and Small Unmanned Aircraft Systems (SUAS) on any Dallas ISD Bond Projects.

This policy requires that all UAS operations are performed in a manner that mitigates risks to safety, security, and privacy, and ensures compliance with the Federal Aviation Administration (FAA), 14 CFR Part 107 (for commercial purposes) and all applicable laws.

Contractors of any tier that will operate a UAS at a Dallas ISD Project must receive approval in advance in accordance with this Policy.

12.1 Operating Requirements

This Policy sets the minimum requirements for operating UAS. The requirements below must be implemented by the General Contractor, through their respective designated Project Manager. Minimum Requirements for UAS Operations and Operator:

a) Operations of UAS must not be conducted during occupied hours or extracurricular activities.
b) Operators of any UAS must hold a current Remote Pilot Certification.
c) Unmanned Aircraft must be FAA registered.
d) Certificate of Authorization must be in place and all requirements followed. The General Contractor must provide UAS / Drone liability coverage either through endorsement to its General Liability policy or a separate Aircraft Liability policy. The policy must name Dallas ISD as an Additional Insured and provide a waiver of subrogation in favor of Dallas ISD.

12.2 Pre-Operation Procedure

(1) General Contractor must submit a request to the Project Manager and DISD Safety Department **48 hours** prior to fly-through.
(2) Project Manager and DISD Safety Department may accept or reject this request.
(3) The Project Manager must verify with school admin that no activities will be taking place during fly-through.
(4) The Project Manager must notify Dallas ISD Police dispatch and school principal of UAS fly-through.

EXHIBITS

POLICY STATEMENT

It is the Dallas ISD's policy that, prior to work, Contractors are required to submit for review, an acceptable Site-Specific Safety Plan that includes safe and health work practices. The Owner's Representative will evaluate the plan to see that it meets the safety requirements for the Project's scope of work.

It is critical that contractors understand the importance of developing an effectively functioning Site-Specific Safety Plan that is pro-active and addresses the exposures to their employees for the particular work to be done. This should be addressed extensively in the Site-Specific Safety Plan.

The Site-Specific Safety Plan must provide guidelines to implement an accident prevention program on Dallas ISD projects, and fully describes the Contractor's commitments for meeting its obligations to provide safe and healthful working conditions for its employees.

This Document is intended to provide a working, uniform minimal level of program guidelines to assist or provide direction to the Contractors. This Document is not intended to replace the need for each Contractor of any tier to establish and maintain a proper Illness and Injury Prevention Program as required by the Department of Labor, Occupational Safety and Health Act (29 CFR 1926 and 29 CFR 1910) and the State of Texas.

EXHIBITS:

- EXHIBIT A – Campus Readiness Form
- EXHIBIT B – Job Hazard Analysis (JHA)
- EXHIBIT C – Demolition SPA Cover Letter
- EXHIBIT D – Confined Space SPA Cover Letter
- EXHIBIT E – Trenching and Excavation SPA Cover Letter
- EXHIBIT F – Pier Drilling SPA Cover Letter
- EXHIBIT G – Utility Shutdown SPA Cover Letter
- EXHIBIT H – Electrical Shutdown SPA Cover Letter
- EXHIBIT I – Shutdown Authorization Form
- EXHIBIT J – Elevated Work SPA Cover Letter
- EXHIBIT K – Crane Operation SPA Cover Letter
- EXHIBIT L – Steel Erection SPA Cover Letter
- EXHIBIT M – Aerial Crane Operation SPA Cover Letter
- EXHIBIT N – Hot Work Permit
- EXHIBIT O – Incident Investigation Report
- EXHIBIT P – Safety Inspection Checklist
- EXHIBIT Q – Contractor Acknowledgement Statement

EXHIBIT A – Campus Readiness Form

A completed copy of this form, along with **photographs of each area** must be provided to the Owner's Representative one (1) working day prior to the return of staff and students to ensure sustainability of proper separation of all work areas and conditions affected by all construction activities.

General Contractor: _____ Project & ORG Number:_____

Person in Charge:_____ Date and Time of Completion: _____

Column: **A** = Adequate	Column: **B** = Inadequate	Column: **C** = Not Applicable

Focused Areas	A	B	C
Appropriate Barricades to prevent non-construction personnel from entering work areas.			
Proper signage displayed near the temporary barricades.			
Access to school facility clean, orderly, and safe, e.g., sidewalks, building entrances, lobbies, corridors, aisles, stairways, etc.			
Critical systems functional, e.g., life safety systems, air conditioning systems, water systems, electrical systems, etc.			
Laydown and Staging areas neat and orderly.			
Campus EAP not impacted by construction activities, e.g., travel ways, access, emergency exits, and egress points, maintained clear of obstructions.			
Proper Traffic Control with work that interfaces with traffic or public			
Trash Dumpsters maintained			
Excavations, Trenches properly barricaded			
All floor holes and openings into which persons can accidentally walk or fall through are guarded by a physical barrier or cover, secured, and labeled.			
Heavy Equipment inside a fenced area and properly secured to prevent unauthorized access.			
Hydraulic Booms and/or Cranes not suspended over playgrounds or occupied areas.			
Construction work areas are kept segregated from school operations, staff, and students			
Nails, screws, and rebar not protruding from lumber or other materials in occupied areas.			
Means of egress for the school occupancy is maintained, free of obstructions, clean, and properly illuminated.			
Remarks:			

EXHIBIT B – Job Hazard Analysis (JHA)

Project Name:	**Contractor Name:**
Date:	**Competent Person Name:**
Scope of work to be Performed:	

EMERGENCY CONTACT LIST ASSOCIATED WITH THIS ACTIVITY		
Name	**Title**	**Phone Number**
1.	1.	1.
2.	2.	2.
3.	3.	3.

STEPS OF THE ACTIVITY	POTENTIAL HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS
1.		
2.		
3.		
4.		

STEPS OF THIS ACTIVITY	POTENTIAL HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		

Potential Fall Hazards	Potential Struck-By Hazards
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.

Potential Electrical Hazards	Potential Caught In-between Hazards
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.

Required Personal Protected Equipment

☐ Hard Hat	☐ Fall Protection	☐ Welding Hood
☐ Gloves	☐ Life Vest	☐ Welding Leathers
☐ Respirator	☐ Hearing Protection	☐ Welding Gloves
☐ Safety Boots	☐ Face Shield	☐ Safety Vest
☐ Rubber Boots	☐ Cutting Goggles	☐ High Vis Pants
☐ Safety Toed Boots	☐ Safety Glasses	☐ Blasting Hood
☐ Tyvek Suits	☐ Safety Goggles	☐ Other (if checked list PPE in the column spaces above)

List Other Protective Equipment (PPE)	
1.	
2.	
3.	
4.	
5.	

Required Equipment and Tools

☐ Telehandler	☐ Concrete Saw	☐ Welding Machine
☐ Crane	☐ Concrete Bucket	☐ Angle Grinder
☐ Scissor Lift	☐ Ladder	☐ HEPA Filtered Tools
☐ Boom Lift	☐ Generator	☐ LOTO System
☐ Scaffolding System	☐ Hand Tools	☐ GFCI
☐ Excavator	☐ Powder Actuated	☐ Cutting Torch
☐ Roofing Kettle	☐ 4-Gas Meter	☐ Other (list on right side)

Other Equipment & Tooling	
1.	
2.	
3.	
4.	
5.	
6.	
7.	

Required Traffic Control Equipment	
☐ Lane Closure	☐ Pilot Car
☐ Barrier Rail	☐ Signage
☐ Trench Plates	☐ Speed Limit
☐ Flagger Station	☐ 6' Fencing

Utilities Located / Marked	
☐ Gas	☐ Overhead
☐ Electric	☐ Sewer/Water
☐ Fiber	☐ Telecommunications
☐ Irrigation	☐ Other Utilities Located:_____

PERSONNEL PARTICIPATING IN THIS ACTIVITY		
Name (Printed)	**Signature**	**Company**
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

EXHIBIT C – Demolition SPA Cover Letter

The following Demolition requirements have been established for the General Contractor's Safety Manager. The General Contractor's Safety Manager must ensure and approve that its Subcontractor's SPA documentation meet all Federal, State, and local regulations and the requirements outlined in this manual prior to submitting for review.

The General Contractor's Safety Manager must submit this Cover Letter, along with the criteria listed below, to the Owner's Representative 5-7 days of any planned critical phases of work. **Demolition activities must not be performed during regular school hours or near occupied areas.**

To hold an on-site Demolition SPA pre-work meeting, at a minimum, the following parties must be present:

- ✓ Subcontractor Competent Person
- ✓ General Contractor Safety Representative
- ✓ Owner's Representative [Optional]

Campus Name and ORG Number: _____

Subcontractor Name and Competent Person: _____

General Contractor Name and Site-Superintendent: _____

General Contractor Safety Manager Signature of Approval: _____

Anticipated Start Date: _____

Demolition SPA must include but is not limited to the following:

- ☐ Scope of Work (describe methods, safe working procedures, and any critical systems affected by this operation. Critical systems include life safety systems, security systems, etc.)
- ☐ Make Safe (confirm if asbestos, lead, and/or other hazardous materials are present within the immediate work areas, provide LOTO procedure, and engineering survey)
- ☐ Asbestos Awareness Training Records (for all crewmembers performing this task)
- ☐ Competent Person Letter of Designation (include areas of competency and signatures)
- ☐ Competent Person Training Documentation (OSHA 10-hour and First Aid/CPR)
- ☐ Silica Exposure Prevention Plan
- ☐ Existing Utilities (describe safe working practices associated with any known utilities that may be affected by demolition activities)
- ☐ Site Map (identifying areas to be affected by demolition)
- ☐ Emergency Action Plan (including emergency contact information and medical facility)
- ☐ JHA (include hazard assessment, equipment, and PPE needed to safely perform this task)

Note: This Document is **not** intended to replace the need for each Contractor to establish and maintain a proper Illness and Injury Prevention Program as required by the Department of Labor, Occupational Safety and Health Act (29 CFR 1926 and 29 CFR 1910) and the State of Texas.

EXHIBIT D – Confined Space SPA Cover Letter

The following Confined Space Entry requirements have been established for the General Contractor's Safety Manager. The General Contractor's Safety Manager must ensure and approve that its Subcontractor's SPA documentation meet all Federal, State, and local regulations and the requirements outlined in this manual prior to submitting for review.

The General Contractor's Safety Manager must submit this Cover Letter, along with the criteria listed below, to the Owner's Representative 5-7 days of any planned critical phases of work.

To hold an on-site Confined Space SPA pre-work meeting, at a minimum, the following parties must be present:

- ✓ Subcontractor Competent Person
- ✓ General Contractor Safety Representative
- ✓ Owner's Representative [Optional]

Campus Name and ORG Number: _____

Subcontractor Name and Competent Person: _____

General Contractor Name and Site-Superintendent: _____

General Contractor Safety Manager Signature of Approval: _____

Anticipated Entry Date: _____

Confined Space SPA must include but is not limited to the following:

- ☐ Scope of Work (describe methods, operating procedures, and affected work areas)
- ☐ Confined Space Entry Procedure (describe atmospheric testing/monitoring methods, ventilation, communication, and make safe procedures to be taken prior to entry)
- ☐ Site Map (identifying entry points, emergency egress locations, and work areas affected by this operation)
- ☐ Confined Space Training Records (for all crewmembers performing this task)
- ☐ Competent Person Letter of Designation (include areas of competency)
- ☐ Competent Person Training Documentation (OSHA 10-hour and First Aid/CPR)
- ☐ Emergency Action Plan (describe emergency actions to be taken should a worker need rescue, first aid, medical treatment, or emergency contact information)
- ☐ JHA (include hazard assessment, equipment, and PPE needed to safely perform this task)

Note: This Document is **not** intended to replace the need for each Contractor to establish and maintain a proper Illness and Injury Prevention Program as required by the Department of Labor, Occupational Safety and Health Act (29 CFR 1926 and 29 CFR 1910) and the State of Texas.

EXHIBIT E – Trenching and Excavation SPA Cover Letter

The following Trenching and Excavation SPA pre-meeting requirements have been established for the General Contractor's Safety Manager. The General Contractor's Safety Manager must ensure and approve that its Subcontractor's SPA documentation meet all Federal, State, and local regulations and the requirements outlined in this manual prior to submitting for review.

The General Contractor's Safety Manager must submit this Cover Letter, along with the criteria listed below, to the Owner's Representative 5-7 days of any planned critical phases of work. **Trenching and Excavation activities must not be performed during regular school hours or near occupied school areas.**

To hold an on-site Excavation SPA pre-work meeting, at a minimum, the following parties must be present:

- ✓ Subcontractor Competent Person
- ✓ General Contractor Safety Representative
- ✓ Owner's Representative [Optional]

Campus Name and ORG Number: _____

Subcontractor Name and Competent Person: _____

General Contractor Name and Site-Superintendent: _____

General Contractor Safety Manager Signature of Approval: _____

Anticipated Start Date: _____

Trenching and Excavation SPA must include but is not limited to the following:

☐ Scope of Work (describe methods, known utilities in the area, and any affected right-of-way)

☐ Utility Strike Prevention (include GPR report, potholing method, and preventative measures)

☐ Excavation Training Records (for all crewmembers performing this task)

☐ Competent Person Letter of Designation (include areas of competency and signatures)

☐ Competent Person Training Documentation (OSHA 10-hour and First Aid/CPR)

☐ Site Map (identify areas affected by this operation and underground utility shut-off locations)

☐ Emergency Action Plan (including emergency contact information and medical facility)

☐ JHA (include hazard assessment, equipment, and PPE needed to safely perform this task)

Note: This Document is **not** intended to replace the need for each Contractor to establish and maintain a proper Illness and Injury Prevention Program as required by the Department of Labor, Occupational Safety and Health Act (29 CFR 1926 and 29 CFR 1910) and the State of Texas.

EXHIBIT F – Pier Drilling SPA Cover Letter

The following Pier Drilling SPA pre-meeting requirements have been established for the General Contractor's Safety Manager. The General Contractor's Safety Manager must ensure and approve that its Subcontractor's SPA documentation meet all Federal, State, and local regulations and the requirements outlined in this manual prior to submitting for review.

The General Contractor's Safety Manager must submit this Cover Letter, along with the criteria listed below, to the Owner's Representative 5-7 days of any planned critical phases of work. **Pier Drilling activities must not be performed during regular school hours or near occupied school areas.**

To hold an on-site Pier Drilling SPA pre-work meeting, at a minimum, the following parties must be present:

- ✓ Subcontractor Competent Person
- ✓ General Contractor Safety Representative
- ✓ Owner's Representative [Optional]

Campus Name and ORG Number: _____

Subcontractor Name and Competent Person: _____

General Contractor Name and Site-Superintendent: _____

General Contractor Safety Manager Signature of Approval: _____

Anticipated Start Date: _____

Pier Drilling SPA must include but is not limited to the following:

☐ Scope of Work (describe methods, known utilities in the area, and any affected right-of-way)

☐ Utility Strike Prevention (include GPR report, potholing method, and preventative measures)

☐ Competent Person Letter of Designation (include areas of competency and signatures)

☐ Competent Person Training Documentation (OSHA 10-hour and First Aid/CPR)

☐ Site Map (identify areas affected by this operation and underground utility shut-off locations)

☐ Emergency Action Plan (including emergency contact information and medical facility)

☐ JHA (include hazard assessment, equipment, and PPE needed to safely perform this task)

Note: This Document is **not** intended to replace the need for each Contractor to establish and maintain a proper Illness and Injury Prevention Program as required by the Department of Labor, Occupational Safety and Health Act (29 CFR 1926 and 29 CFR 1910) and the State of Texas.

EXHIBIT G – Utility Shutdown SPA Cover Letter

The following Utility Shutdown requirements have been established for the General Contractor's Safety Manager. The General Contractor's Safety Manager must ensure and approve that its Subcontractor's SPA documentation meet all Federal, State, and local regulations and the requirements outlined in this manual prior to submitting for review.

The General Contractor's Safety Manager must submit this Cover Letter, along with the criteria listed below, to the Owner's Representative 5-7 days of any planned critical phases of work. **Contractors of any tier must at no time perform any type of power or other utility shutdown activities during regular school hours**.

To hold an on-site Utility Shutdown SPA pre-work meeting, at a minimum, the following parties must be present:

- ✓ Subcontractor Competent Person
- ✓ General Contractor Safety Representative
- ✓ Owner's Representative [Optional]

Campus Name and ORG Number: _____

Subcontractor Name and Competent Person: _____

General Contractor Name and Site-Superintendent: _____

General Contractor Safety Manager Signature of Approval: _____

Anticipated Shutdown Date: _____

Utility Shutdown SPA must include but is not limited to the following:

- ☐ Shutdown Authorization Form (EXHIBIT I) must be submitted **10 days prior** to any planned shutdown and must contain pre-work notification signatures of approval)
- ☐ Scope of Work (describe methods, operating procedures, and any critical systems affected by this shutdown. Critical systems include life safety systems, security systems, kitchen, etc.)
- ☐ De-energizing System (describe system to be shutdown, methods for controlling hazardous energy, inadvertent release of stored energy, and make safe procedures)
- ☐ Contingency Plan (to prevent any disruptions to school operations, describe emergency actions to be taken for restoring system operations as quickly as possible)
- ☐ Restoring System (describe methods for safely restoring systems, removal of LOTO devices)
- ☐ Competent Person Letter of Designation (include areas of competency and signatures)
- ☐ Competent Person Training Documentation (OSHA 10-hour and First Aid/CPR)
- ☐ Site Map (identifying areas where shutdown is to be performed)
- ☐ Emergency Action Plan (including emergency contact information and medical facility)
- ☐ JHA (include hazard assessment, equipment, and PPE needed to safely perform this task)

Note: This Document is **not** intended to replace the need for each Contractor to establish and maintain a proper Illness and Injury Prevention Program as required by the Department of Labor, Occupational Safety and Health Act (29 CFR 1926 and 29 CFR 1910) and the State of Texas.

EXHIBIT H – Electrical Shutdown SPA Cover Letter

The following Electrical Shutdown requirements have been established for the General Contractor's Safety Manager. The General Contractor's Safety Manager must ensure and approve that its Subcontractor's SPA documentation meet all Federal, State, and local regulations and the requirements outlined in this manual prior to submitting for review.

The General Contractor's Safety Manager must submit this Cover Letter, along with the criteria listed below, to the Owner's Representative 5-7 days of any planned critical phases of work.

To hold an on-site Electrical Shutdown SPA pre-work meeting, at a minimum, the following parties must be present:

- ✓ Subcontractor Competent Person
- ✓ General Contractor Safety Representative
- ✓ Owner's Representative [Optional]

Campus Name and ORG Number: _____

Subcontractor Name and Competent Person: _____

General Contractor Name and Site-Superintendent: _____

General Contractor Safety Manager Signature of Approval: _____

Anticipated Shutdown Date: _____

Electrical Shutdown SPA must include but is not limited to the following:

- ☐ Shutdown Authorization Form (EXHIBIT I) must be submitted **10 days prior** to any planned shutdown and must contain pre-work notification signatures of approval)
- ☐ Scope of Work (describe methods, operating procedures, and any critical systems affected by this shutdown. Critical systems include life safety systems, security systems, kitchen, etc.)
- ☐ De-energizing System (describe system to be shutdown, methods for controlling hazardous energy, inadvertent release of stored energy, and make safe procedures – NFPA 120.2)
- ☐ Contingency Plan (to prevent any disruptions to school operations, describe emergency actions to be taken for restoring system operations as quickly as possible)
- ☐ Restoring System (describe methods for safely restoring systems, removal of LOTO devices)
- ☐ Electrically Qualified Person [NFPA 70 E] Training Records – NFPA 120.2(b)(2)
- ☐ Competent Person Letter of Designation (include areas of competency and signatures)
- ☐ Competent Person Training Documentation (OSHA 10-hour and First Aid/CPR)
- ☐ Site Map (identifying areas where shutdown is to be performed)
- ☐ Emergency Action Plan (including emergency contact information and medical facility)
- ☐ JHA (include hazard assessment equipment, and PPE needed to safely perform this task)

Note: This Document is **not** intended to replace the need for each Contractor to establish and maintain a proper Illness and Injury Prevention Program as required by the Department of Labor, Occupational Safety and Health Act (29 CFR 1926 and 29 CFR 1910) and the State of Texas.

EXHIBIT I – Shutdown Authorization Form

Dallas Independent School District
Bond Program
Scheduled Utility Shutdown Authorization Form: General Contractor(s)

SECTION A. GENERAL INFORMATION: ☐ ***Permanent** ☐ **Temporary**

School Name and Org. #: _____

Bond Program Manager (PM) Name: _____

General Contractor (GC) Person In-Charge: _____ _____

Sub-Contractor (SUB) Person In-Charge: (Name) _____ (Contact No.) _____

SECTION B. PRE-WORK NOTIFICATION:

Utility System(s) to Be Shut down: _____

Utility Meter number _____

Description of Work Performed: _____

Describe Procedure for Shutdown: _____

Safety Measures/ Precautions for Shutdown: _____

Date/ Time **Requested** for Shutdown: _____ Shutdown Date _____ Shutdown Time _____ Restart Date _____ Restart Time

It is requested that the noted** building system(s) be allowed for "shutdown" **by the General Contractor to allow for our tie-in of services for the Project as enumerated below. We note that** five (5) days advance notice **is required as a minimum. I hereby certify that the required work has been coordinated and scheduled to achieve completion within the requested time-period.

SUB Person-In-Charge: **(Sign)** _____ **(Date)** _____

GC Person-In-Charge: _____ (Sign) _____ (Date)

Bond Program Manager (PM) Approval: _____ (Sign) _____ (Date)

DISD Project Manager Approval: _____ (Sign) _____ (Date)

SECTION C. POST-WORK CERTIFICATION:

Actual Date/ Time for Shutdown: _____ Shutdown Date _____ Shutdown Time _____ Restart Date _____ Restart Time

GC Person-In-Charge Certification: _____ (Sign) _____ (Date)

Bond Program Manager (PM) Certification: _____ (Sign) _____ (Date)

DISD Project Manager Certification: _____ (Sign) _____ (Date)

DISD Sustainability Certification: _____ (Sign) _____

SECTION D. PROCESS FOR SCHEDULED UTILITY SHUTDOWN AUTHORIZATION

A. The General Contractor is to complete the *Utility Shutdown Request Form*, at least **5 working days** prior to the scheduled utility shutdown, and submit it to the respective Bond Program Manager for approval.

B. The Bond Program Manager (PM) will review and approve submitted *Utility Shutdown Request Form* and forward to the respective Dallas ISD Project Manager for approval.

C. The Dallas ISD Project Manager will review and approve form and return to the PM.

D. PM forwards approved form to Director/Maintenance Solutions and notifies Deputy Chief Director, Emergency Operations and Bond Program Safety Manager.

Note: All scheduled shutdown requests will require a jobsite meeting with the Program Manager and the School staff 48 hours in advance to discuss the outage procedures and status of all District departments involved on the shutdown request.

Note: For electrical shutdowns (Scheduled/ involuntary), when required for building operations, the General contractor must supply a power generator to keep the telephones, data and alarms working at all times.

***Permanent shutdowns are facilities or specific meters that will not require power/ utility to be restored.**

EXHIBIT J – Elevated Work SPA Cover Letter

The following Elevated Work SPA pre-meeting requirements have been established for the General Contractor's Safety Manager. The General Contractor's Safety Manager must ensure and approve that its Subcontractor's SPA documentation meet all Federal, State, and local regulations and the requirements outlined in this manual prior to submitting for review.

The General Contractor's Safety Manager must submit this Cover Letter, along with the criteria listed below, to the Owner's Representative 5-7 days of any planned critical phases of work. **No roof work, regardless of the extent, is to be done over an occupied area/building.**

To hold an on-site Elevated Work SPA pre-work meeting, at a minimum, the following parties must be present:

- ✓ Subcontractor Competent Person
- ✓ General Contractor Safety Representative
- ✓ Owner's Representative [Optional]

Campus Name and ORG Number: _____

Subcontractor Name and Competent Person: _____

General Contractor Name and Site-Superintendent: _____

General Contractor Safety Manager Signature of Approval: _____

Anticipated Start Date: _____

Elevated Work SPA must include but is not limited to the following:

☐ Scope of Work (describe methods, operating procedures, and affected work areas)

☐ Fall Protection (describe systems to be used, methods, anchor point locations, etc.)

☐ Fall Protection Training Records (for all crewmembers performing this task)

☐ Competent Person Letter of Designation (include areas of competency and signatures)

☐ Competent Person Training Documentation (OSHA 10-hour and First Aid/CPR)

☐ Site Map (identifying areas where work is to be performed)

☐ Emergency Action Plan (including emergency contact information and medical facility)

☐ JHA (include hazard assessment, equipment, and PPE needed to safely perform this task)

Note: This Document is **not** intended to replace the need for each Contractor to establish and maintain a proper Illness and Injury Prevention Program as required by the Department of Labor, Occupational Safety and Health Act (29 CFR 1926 and 29 CFR 1910) and the State of Texas.

EXHIBIT K – Crane Operation SPA Cover Letter

The following Crane Operation requirements have been established for the General Contractor's Safety Manager. The General Contractor's Safety Manager must ensure and approve that its Subcontractor's SPA documentation meet all Federal, State, and local regulations and the requirements outlined in this manual prior to submitting for review.

The General Contractor's Safety Manager must submit this Cover Letter, along with the criteria listed below, to the Owner's Representative 5-7 days of any planned critical phases of work. **Booms or suspended loads must not be allowed to pass over playgrounds or other school property when there is a potential for students or staff to be present in these areas and/or within any fall radius.**

To hold an on-site Crane Operations SPA pre-work meeting, at a minimum, the following parties must be present:

- ✓ Subcontractor Competent Person
- ✓ General Contractor Safety Representative
- ✓ Owner's Representative [Optional]

Campus Name and ORG Number: _____

Subcontractor Name and Competent Person: _____

General Contractor Name and Site-Superintendent: _____

General Contractor Safety Manager Signature of Approval: _____

Anticipated Lift Date: _____

Crane Operations SPA must include but is not limited to the following:

☐ Scope of Work (describe methods, operating procedures, and affected work areas)

☐ Crane Location and Logistics Plan (identify underground and overhead crane hazards)

☐ Lift Plan (identify load capacities, means of communication, and rigging/lifting methods)

☐ Site Map (identifying sequence of operation and fall radius in relation to any occupied areas)

☐ Crane Certificate of Insurance and Annual Inspection Records

☐ Competent Person Letter of Designation (include areas of competency and signatures)

☐ Competent Person Training Documentation (OSHA 10-hour and First Aid/CPR)

☐ Crane Operator Certification and Medical Card

☐ Rigger and Signal Person Training Records

☐ Fall Protection (if applicable, describe systems to be used, methods, anchor point locations, etc.)

☐ Fall Protection Training Records (for all crewmembers performing this task)

☐ Emergency Action Plan (including emergency contact information and medical facility)

☐ JHA (include hazard assessment, equipment, and PPE needed to safely perform this task)

Note: This Document is **not** intended to replace the need for each Contractor to establish and maintain a proper Illness and Injury Prevention Program as required by the Department of Labor, Occupational Safety and Health Act (29 CFR 1926 and 29 CFR 1910) and the State of Texas.

EXHIBIT L – Steel Erection SPA Cover Letter

The following Steel Erection requirements have been established for the General Contractor's Safety Manager. The General Contractor's Safety Manager must ensure and approve that its Subcontractor's SPA documentation meet all Federal, State, and local regulations and the requirements outlined in this manual prior to submitting for review.

The General Contractor's Safety Manager must submit this Cover Letter, along with the criteria listed below, to the Owner's Representative 5-7 days of any planned critical phases of work. **Steel Erection must not be allowed when students and/or staff are present in occupied areas and/or within any fall radius.**

To hold an on-site Steel Erection SPA pre-work meeting, at a minimum, the following parties must be present:

- ✓ Subcontractor Competent Person
- ✓ General Contractor Safety Representative
- ✓ Owner's Representative [Optional]

Campus Name and ORG Number: _____

Subcontractor Name and Competent Person: _____

General Contractor Name and Site-Superintendent: _____

General Contractor Safety Manager Signature of Approval: _____

Anticipated Start Date: _____

Steel Erection SPA must include but is not limited to the following:

☐ Scope of Work (describe methods, operating procedures, and affected work areas)

☐ Steel Erection Plan (describe equipment placement, lifting methods, and connection procedures)

☐ Written Notification from the General Contractor confirming concrete footings, piers, and/or walls have been cured to a level that will provide adequate structural strength and stability.

☐ Site Map (identifying sequence of operation and fall radius in relation to any occupied areas)

☐ Fall Protection procedures (describe systems to be used, Controlled Access Zones, etc.)

☐ Fall Protection Training Records (for all crewmembers performing this task)

☐ Rigger and Signal Person Training Records

☐ Competent Person Letter of Designation (include areas of competency and signatures)

☐ Competent Person Training Documentation (OSHA 10-hour and First Aid/CPR)

☐ Emergency Action Plan (including emergency contact information and medical facility)

☐ JHA (include hazard assessment, equipment, and PPE needed to safely perform this task)

Note: This Document is **not** intended to replace the need for each Contractor to establish and maintain a proper Illness and Injury Prevention Program as required by the Department of Labor, Occupational Safety and Health Act (29 CFR 1926 and 29 CFR 1910) and the State of Texas.

EXHIBIT M – Aerial Crane Operation SPA Cover Letter

The following Aerial Crane Operation requirements have been established for the General Contractor's Safety Manager. The General Contractor's Safety Manager must ensure and approve that its Subcontractor's SPA documentation meet all Federal, State, and local regulations and the requirements outlined in this manual prior to submitting for review.

The General Contractor's Safety Manager must submit this Cover Letter, along with the criteria listed below, to the Owner's Representative 5-7 days of any planned critical phases of work. **Aircraft or suspended loads must not be allowed to pass over playgrounds or other school property when there is a potential for students, staff, or public to be present in these areas and/or within any potential drop zones.**

To hold an on-site Aerial Crane Operations SPA pre-work meeting, at a minimum, the following parties must be present:

- ✓ Subcontractor Competent Person
- ✓ General Contractor Safety Representative
- ✓ Owner's Representative [Optional]

Campus Name and ORG Number: _____

Subcontractor Name and Competent Person: _____

General Contractor Name and Site-Superintendent: _____

General Contractor Safety Manager Signature of Approval: _____

Anticipated Lift Date: _____

Aerial Crane Operations SPA must include but is not limited to the following:

☐ Lift Plan (scope of work, travel path, ground level and ariel hazards or obstructions)

☐ Site Set-Up (overhead map of staging areas, sequence of operation, primary and alternate emergency area locations, and potential drop zones in relation to occupied areas)

☐ Material to be lifted (method of attachment, rigging to be used, configuration, and load capacities)

☐ Roles and responsibilities (communication methods for ground crew, roof crew, and operator)

☐ Competent Person Letter of Designation form (include areas of competency and proof of training)

☐ Rigger and signal person training records

☐ JHA (include hazard assessment, equipment, and PPE needed to safely perform this task)

☐ Emergency Action Plan (including emergency contact information and medical facility)

☐ Standard Airworthiness Certificate

☐ Congested Area Plan Request to FAA

☐ FAA Registry of Aircraft

☐ FAA Airman Detail Report

☐ Notification of Dallas City Officials

☐ Certificate of Aircraft liability insurance (insurance limit must be $10 million, per contract amount)

☐ Evidence of additional insured and waiver of subrogation endorsement

EXHIBIT N – Hot Work Permit

All temporary work involving open flames, intense heat, or sparks will require a Hot Work Permit. The permit must be issued by the contractor and authorized by the appropriate supervisor before any hot work (welding, brazing, cutting, grinding, etc.) can begin. Two copies of the Hot Work Permit must be made. One should be filed with the contractor. The second copy should be posted at the site of the hot work until the job is completed.

Issue Date:	Permit Expires:	
Building:	Sub:	Area:
Authorizing Supervisor (GC):	Start Time:	End Time:
Operator:	Fire Watch:	

Checklist

Following items must be checked by the authorizing supervisor and operator/welder. If any item is checked "No", then hot work must not begin until item or area is corrected.

Yes	No	
☐	☐	Work area examined
☐	☐	Equipment inspected, in good repair
☐	☐	PPE inspected, in good repair
☐	☐	Sprinkler system operable
☐	☐	Combustible materials/items moved a radius of 35 feet away from work area.
☐	☐	Explosive atmosphere (s) eliminated
☐	☐	Floor and wall openings covered
☐	☐	Fire watch assigned and required during work and for 30 minutes afterwards*
		*Fire watch must be at least 30 minutes in duration
☐	☐	Fire watch has ample extinguishing equipment and is trained to properly use it
☐	☐	Work area is considered a confined space (if yes additional confined space will be required. Contact supervisor before proceeding)
☐	☐	Proper ventilation provided for the work area

Other precautions

1._____

2._____

Authorizing Supervisor Signature:_____ Date:_____

Final Checkup: To be completed after hot work is finished and fire watch is over

The work area and all surrounding areas subjected to heat and sparks were monitored during the hot work operations and during the required fire watch period and found to be safe.

Fire Watcher Signature: _____ Title:_____ Date:_____

EXHIBIT O – Incident Investigation Report

CONTRACTOR: _____ACCIDENT DATE: _____TIME: _____LOCATION _____

ACCIDENT LOCATION (SPECIFIC): _____

WHAT HAPPENED? (Describe operation, activity, condition and how accident or loss occurred.

Use separate sheet and diagram if necessary): _____

_____

Recommended correction action:

_____

Equipment involved #: _____Employee involved: _____

Employee Injury (Describe):

_____

Root Cause (Describe): _____

Medical referral? Yes____ No_____

Company Property Damage or Loss

(Describe): _____

DISD Property, Damage, or Injury to Others

(Describe): _____

Witnesses (Name, address, phone): _____

Police Report Number: _____ DISD Police Report Number: _____

Foreman/Supervisor_____ Date: _____

Keep Original in contractor's File and CC: Owner's Representatives

[Attach Photos]

EXHIBIT P – Safety Inspection Checklist

SAFETY INSPECTION CHECKLIST				
Contractor:	Contract No.			
Job-site Location:				
Person in Charge:				
Date: Time:				
Person(s) making inspection:	Column: A= Adequate B= Inadequate N/A = Not Applicable			
PROGRAM ADMINISTRATION:	A	B	N/A	REMARKS
1. Posting OSHA and other job-site warning posters.				
2. Do you have safety meetings?				
3. Job safety training, including first-aid training?				
4. Is first-aid equipment and supplies available?				
5. Are job-site injury records being kept?				
6. Are emergency telephone numbers, such as police department, fire department, doctor, hospital, and ambulance, posted?				
HOUSEKEEPING AND SANITATION:	A	B	N/A	REMARKS
1. General neatness of working areas.				
2. Regular disposal of waste and trash.				
3. Passageways and walkways clear?				
4. Adequate lighting.				
5. Protruding nails removed or bent over?				
6. Oil and grease removed.				
7. Waste containers provided and used.				
8. Sanitary facilities adequate and clean.				
9. Drinking water potable.				
10. Adequate supply of water.				

11. Disposable drinking cups.				
FIRE PREVENTION:	A	B	N/A	REMARKS
1. Fire instructions to personnel.				
2. Fire extinguishers identified, checked, accessible.				
3. Proper fire extinguishers provided.				
4. Hydrants clear, access to public thoroughfare open.				
5. Good housekeeping.				
6. "No Smoking" signage posted and enforced where needed.				
7. Fire brigades.				
ELECTRICAL INSTALLATIONS:	A	B	N/A	REMARKS
1. Adequate wiring, well insulated.				
2. Circuit breakers and GFCI (where required) provided.				
3. Fire hazards checked.				
4. Electrical danger signs posted.				
5. Are terminal boxes equipped with required covers? Are covers used?				
HAND TOOLS:	A	B	N/A	REMARKS
1. Proper tool being used for each job.				
2. Neat storage, safe carrying.				
3. Inspection and maintenance.				
4. Damaged tools repaired or replaced promptly. Are employee's tools inspected and repaired?				

POWER TOOLS:	A	B	N/A	REMARKS
1. Good housekeeping where tools are used.				
2. Tools and cords in good condition.				
3. Proper grounding.				
4. Proper instruction in use.				
5. All mechanical safeguards in use.				
6. Tools neatly stored when not in use.				

7. Right tool being used for the job at hand.				
8. Wiring properly installed.				
POWDER ACTUATED TOOLS:	A	B	N/A	REMARKS
1. Local laws and ordinances complied with.				
2. All operators trained.				
3. Tools and charges protected from unauthorized use.				
4. Competent instruction and supervision.				
5. Tools checked and in good working order.				
6. Tools not used on anything but recommended materials.				
7. Safety goggles or face shields provided and used.				
8. Flying hazard checked by backing up, removal of personnel, or use of captive stud tool.				
LADDERS:	A	B	N/A	REMARKS
1. Ladders inspected and in good condition?				
2. Secured to prevent slipping, sliding, or falling?				
3. Do side rails extend 36" above top of landing?				
4. Rungs or cleats not over 12" on center.				
5. Metal ladders not used around electrical hazards.				
6. Proper maintenance and storage.				
7. Are ladders not painted?				

SCAFFOLDING:	A	B	N/A	REMARKS
1. Is erection properly supervised?				
2. Will all structural members meet the safety factor?				
3. Are all connections secure?				
4. Is scaffold tied into structure where necessary?				
5. Are working areas free of debris, snow, ice, grease?				
6. Are base plates and mud sills provided?				
7. Are workers protected from falling objects?				

8. Is the scaffold plumb and square with cross- bracing?				
9. Are guardrails, intermediate rails, and toe boards in place?				
10. Are hoist ropes and cables in good condition?				
HOISTS, CRANES AND DERRICKS:	A	B	N/A	REMARKS
1. Inspect cables and sheaves.				
2. Check slings and chains, hooks, and eyes.				
3. Equipment firmly supported.				
4. Outriggers used, proper cribbing.				
5. Power lines deactivated, removed or at safe distance				
6. Proper loading for capacity of lifting radius.				
7. All equipment properly lubricated and maintained.				
8. Signalman where needed.				
9. Signals understood and observed.				
10. Are inspection and maintenance logs maintained?				
HEAVY EQUIPMENT:	A	B	N/A	REMARKS
1. Regular inspection and maintenance.				

2. Lubrication and repair of moving parts.				
3. Lights, brakes, warning signals operative.				
4. Wheels chocked when necessary.				
5. Haul roads well maintained and laid out properly.				
6. Protection when equipment is not in use.				
7. Shut-off devices on hose lines in case of failure?				
MOTOR VEHICLES:	A	B	N/A	REMARKS
1. Regular inspection and maintenance.				
2. Qualified operators.				
3. Brakes, lights, warning devices operative.				

4. Weight limits and load sizes controlled.				
5. Is all glass in good condition?				
6. Are back-up (reverse) alarms provided?				
7. Fire extinguishers provided in all vehicles?				
BARRICADES:	A	B	N/A	REMARKS
1. Floor openings planked over and secured, or barricaded.				
2. Roadways and sidewalks effectively protected.				
3. Adequate lighting provided.				
4. Traffic controlled.				
HANDLING AND STORAGE OF MATERIALS:	A	B	N/A	REMARKS
1. Are materials properly stored or stacked?				
2. Are passageways clear?				
3. Stacks on firm footings, not too high.				
4. Proper number of men for each operation.				
5. Are workers lifting loads correctly?				

6. Are materials protected from weather conditions?				
7. Protection against falling.				
8. Is dust protection observed?				
9. Extinguishers and other fire protection provided.				
10. Is traffic controlled in the storage area?				
EXCAVATION AND SHORING:	A	B	N/A	REMARKS
1. Are adjacent structures properly shored?				
2. Is shoring, benching, or sloping used for soil depth or excavation properly sloped?				
3. Are roads and sidewalks supported and protected?				
4. Is material stored at least 2 feet from excavations?				
5. Is excavation barricaded and lighting provided?				
6. Is equipment a safe distance from edge of excavation?				
7. Are ladders provided where needed?				

8. Are equipment ramps adequate?				
9. Is job supervisor on-site during trenching operations?				
DEMOLITION:	A	B	N/A	REMARKS
1. Are operations planned ahead?				
2. Is there shoring of adjacent structures?				
3. Are material chutes used?				
4. Is there sidewalk and other public protection?				
5. Adequate access ladders or stairs.				
FLAMMABLE GASSES AND LIQUIDS:	A	B	N/A	REMARKS
1. All containers U.L. approved meeting OSHA requirements with contents clearly identified.				
2. Proper storage practices observed.				
3. Fire hazards checked.				
4. Proper storage temperatures and protection.				
5. Proper types and number of extinguishers nearby.				
6. Carts for moving cylinders available.				
MASONRY:	A	B	N/A	REMARKS
1. Proper scaffolding.				
2. Saws properly equipped; dust protection provided.				
ROADWAY CONSTRUCTION:	A	B	N/A	REMARKS
1. Laws and ordinances observed.				
2. Flag-person properly dressed, instructed, and posted.				
3. Adequate warning signs and markers.				
4. Equipment not blocking right of way.				
5. Traffic control through construction site.				
6. Adequate marking and maintenance of detours.				
7. Dust control.				
8. Adequate lighting.				
PERSONAL PROTECTIVE EQUIPMENT:	A	B	N/A	REMARKS
1. Eye and Head protection.				
2. Face shields.				
3. Respirators and masks.				
List actions to be taken for all items found non-compliant				

EXHIBIT Q – Contractor Acknowledgement Statement

Campus Name and ORG Number: _____

Contractor Name:_____

Date: _____

By executing this document as an authorized representative of the referenced Company identified above, I acknowledge and confirm that I have read and understand the contents of the Dallas ISD Construction Safety Program Guidelines in its entirety.

I also recognize and acknowledge that the obligation to protect the safety and health of all persons affected by construction activities is not limited to the requirements of the Dallas ISD Construction Safety Program Guidelines only, but also includes all applicable OSHA, Federal, State, and local regulations, and guidelines necessary to provide a safe and healthful working environment for all contractors, campus staff, students, and general public.

The Contracting Company and its employees will comply with all applicable safety requirements while performing work on any Dallas ISD property. The Company will further communicate the requirements of the Dallas ISD Construction Safety Program Guidelines and other applicable OSHA, Federal, State, and local regulations, and guidelines to all tiered Subcontractors that will perform work on the Project and retain a physical signed copy of this Contractor Acknowledgement Statement from each such Subcontractor.

_____
(Name of Authorized Representative)

_____
(Signature of Authorized Representative)

_____
(Date Signed)

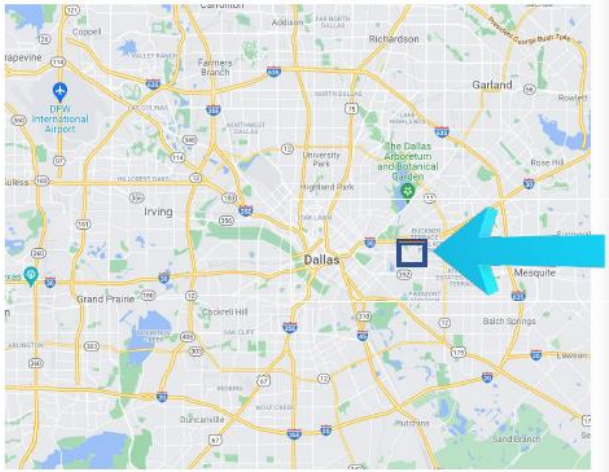
ATTACHMENTS

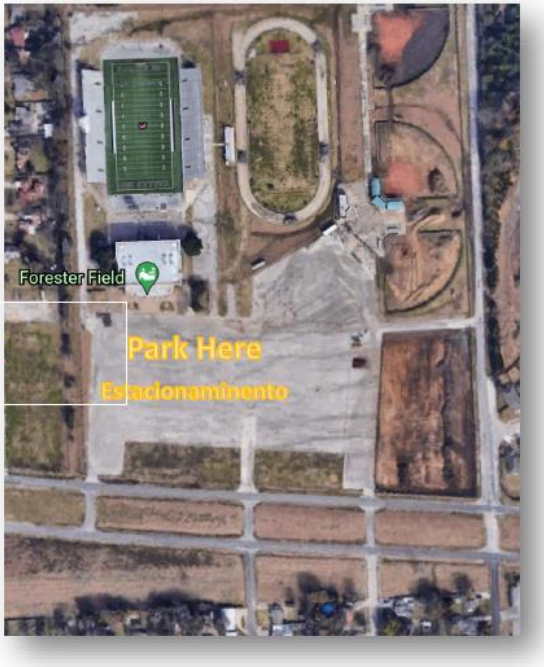
- Attachment I – Dallas ISD Orientation Location and Schedule
- Attachment II – Site-Specific Safety Plan Guidelines
- Attachment III – Crisis Communications Poster
- Attachment IV – Visitor's Release and Hold Harmless Agreement
- Attachment V – Shutdown Notification Guidelines
- Attachment VI – SWPPP Oversight Flowchart
- Attachment VII – Greenfield Shutdown Authorization Request Guidelines
- Attachment VIII – Intruder Detection
- Attachment IX – Campus Security Reminders
- Attachment X – Safety Meeting Sign-in Sheet
- Attachment XI – Geotechnical Soil Sampling Safety Guidelines
- Attachment XII – Inclement Weather Plan of Action

Dallas ISD Orientation Location and Schedule

DALLAS INDEPENDENT SCHOOL DISTRICT

Construction Services





Dallas ISD
Construction Safety Orientation
(Orientacion de Seguridad)

Location/Ubicacion
Forester Field
8233 Military Pkwy
Dallas, TX 75227

Schedule/Horario
7:30am-8:30am
Tuesday and Thursday
Martes y Jueves

You must have your Dallas ISD Badge to attend this orientation.

Usted debe tener su identificacion para poder asistir a esta Orientacion.

CRITERIA FOR DEVELOPING A SITE-SPECIFIC SAFETY PLAN

Prior to work, Contractors are required to submit for review, an acceptable Site-Specific Safety Plan that includes safe and health work practices. The Owner's Representative will evaluate the plan to see that it meets the safety requirements for the Project's scope of work.

A Site-Specific Safety Plan must include but is not limited to the following:

(1) **Scope of Work:** A description of the scope of work is to be included on the front page of the Site-Specific Safety Plan.

(2) **Job Safety Procedures:** Explain in detail and specifically how job safety is to be incorporated into each phase of the scope of work. Use of ladders, scaffolds, flagging, equipment, exposures, special conditions, fall protection, etc., must be included for the plan to be accepted. Generalities will not be accepted to Explain the safety and health conditions employees will be exposed to.

(3) **General Contractor's Site-Specific Safety Orientation:** Each employee who is new to the jobsite must receive a thorough safety and hazard communication orientation, which imparts basic information about the project safety and health program, federal/state regulations, and other safety rules and regulations needed to perform tasks safely. Future safety instructions may be necessary if hazardous work and/or unfamiliar tasks are performed.

(4) **Competent Person Designation(s):** Competent Person Designation Form(s) accompanied by a valid First Aid/CPR and OSHA 30-hour certification (within 5 years of the issuing date) must be provided for all on-site persons designated as competent.

(5) **Supervising for Safety:** Explain how supervisors are going to constantly review the safe practices and procedures. Jobsite inspections are required daily. An inspection checklist should be documented at least weekly.

(6) **Disciplinary Policy:** Contractor must explain disciplinary action for any employee who jeopardizes his health or safety, or the health or safety of others.

(7) **Subcontractor Compliance:** Explain how Subcontractor compliance with your safety program and the Construction Minimum Safety Program Guidelines Manual will be verified and documented. When Subcontractor's programs are deficient, the General Contractor must be responsible for providing them with the necessary training and protection. This must be documented.

(8) **Incident Investigation Procedure:** Explain how the General Contractor and involved Subcontractors will investigate all incidents involving a near miss, injury, and/or property damage. Investigation Procedures must include a Root Cause Analysis and Corrective Action Plan to prevent reoccurrence.

(9) **Emergency Action Plan:** Describe Actions to be taken should an emergency occur. Emergency Action Plans must cover injuries, fires, evacuations, and similar situations. Plans must include designated emergency contact names and telephone numbers, e.g., on-site supervision, police department, fire department, doctor, hospital, and ambulance.

(10) **Personal Protective Equipment:** Describe Personal Protective Equipment (PPE) to be worn, training requirements, and parameters for its use.

(11) **Occupational Health Programs:** Site-specific Occupational Health and Illness Prevention Programs are required to protect employees working on the project, i.e., Asbestos Awareness, Air Monitoring, Silica, Sampling, Special Protective Clothing or Equipment, and Particular Hazards.

(12) **Job Hazard Analysis (JHA):** Explain the formal job hazard analysis process

(13) **Task Training:** Contractors are required to task train employees in the exposures they will be confronted with and the job they are expected to perform. Other situations, however, may arise during the course of the project that will require additional training. Explain how task training will be accomplished, how often it will be conducted, and who will be conducting the training.

(14) **Reporting Unsafe Acts or Conditions:** Explain the program in place that promotes positive feedback to supervision and employees who report unsafe acts and/or conditions.

(15) **Toolbox Talk Safety Meetings:** These must be held and documented at least weekly. Explain who will be responsible for conducting these meetings, when they will be held, and where they will be held.

(16) **Fire Prevention and Protection Plan:** Explain the job-site fire prevention and protection program in detail.

(17) **Hazard Communication Program:** Provide copy of the Site-specific Haz-Com program.

(18) **Lock-out/Tag-out (LOTO) Program**: Provide a copy of the Site-specific LOTO Program

(19) **Confined Space Entry:** Provide a copy of the Site-specific Confined Space Program

(20) **Trenching/Excavation and Utility Strike Prevention**: Provide a copy of the Site-specific Trenching/Excavation Procedures and a Utility Strike Prevention Plan.

(21) **Fall Protection and Prevention Program:** Provide a copy of the Site-specific Fall Protection and Prevention Program

(22) **Traffic Control Plan:** Provide a copy of the Site-specific Traffic Control Plan

(23) **Substance Abuse Policy:** Provide a copy of the Substance Abuse Policy

(24) **Special Instructions and Information:** Provide any special instruction or additional safety information as it relates to the unique conditions and/or environment associated with the project.

Note: The requirements outlined in this Document are intended to provide a working, uniform minimal level of program guidelines to assist or provide direction to Contractors. This Document is **not** intended to replace the need for each Contractor of any tier to establish and maintain a proper Illness and Injury Prevention Program as required by the Department of Labor, Occupational Safety and Health Act (29 CFR 1926 and 29 CFR 1910) and the State of Texas.

CONSTRUCTION SITE Crisis Communications GUIDELINES

SUGGESTED STEPS FOR CRISIS SITUATIONS:

1. Evaluate the situation and extent of damage or injuries.
2. If students are present, immediately contact the principal or school office.
3. Call 9-1-1 if necessary. Be prepared to give the dispatcher details of the accident and injuries, the exact address and where emergency crews should enter the site.
4. Assign someone to meet emergency crews at the gate.
5. Call Dallas ISD Communications at (972) 925-3917. Be prepared to provide as much information as possible.
6. Call Dallas ISD Police at (214) 932-5627.
7. Call Construction Services at (972) 925-7200.
8. Call the Safety Manager at (214) 435-2204.
8. Other than as noted below, *do not speak* to reporters or photographers. Refer them to Dallas ISD Communications.

How to handle reporters who come to the construction site:

There is no such thing as "off the record." Be polite, but firm. Tell reporters and photographers they must wait off-site, outside the main gate, until an authorized Dallas ISD spokesperson arrives. Do not push, shove, block, or attempt to physically restrain a reporter or photographer. When dealing with reporters, photographers or TV crews, always assume that they are recording.

EMERGENCY TELEPHONE NUMBERS:

Dallas ISD Police
(214) 932-5627

Robyn Harris
Dallas ISD Communications/ District Spokesperson
(972) 925-3917

Alvaro Meza
Bond Program Safety Manager
(214) 435-2204

DALLAS INDEPENDENT SCHOOL DISTRICT

Visitor's Release and Hold Harmless Agreement

General Contractor: _____

Project Name: _____ Date: _____

In consideration of being permitted, for my own purposes and interests, to enter upon the premises or construction site of Dallas Independent School District Construction Project, I hereby release, hold harmless, and indemnify the Dallas Independent School District, Consultants, Inspectors, Contractors and Subcontractors from and against, and assume the risk for and on behalf of myself, my heirs, my supervisor and my estate, all damages, losses, injuries and any and all other claims of any type whatsoever for personal injury (including death) and other loss or damage of any nature whatsoever including damage to my personal property, and reasonable attorney's fees and court costs sustained or caused while on such premises or site.

In the event any clause, term, or provision of this agreement must be declared or adjudicated void or invalid, it must in no manner affect the other clauses, terms, and provisions hereof, which must remain in full force and effect, as if the clause, term, or provision so declared or adjudicated invalid was not originally a part hereof.

Visitor's Name: _____

Visitor's Signature: _____

Address: _____

Date: _____

Shutdown Notification Guidelines

The General Contractor must provide Dallas ISD with notification of power or other utility shutdown no less than ten (10) calendar days in advance of the shutdown. Notification includes Dallas ISD Central Maintenance Office, A/E, Program Manager, and the Principal at each affected school.

- Shutdown Authorization Form (EXHIBIT I) must be submitted to the Dallas ISD Bond Program Manager and Dallas ISD Project Manager for signatures of approval **10 days prior** to any planned shutdown.
- Shutdowns to be scheduled during weekends or extended breaks.
- Overtime Code may be needed for Dallas ISD Personnel involved after hours.
- Permanent shutdowns must be field verified by Contractor. If utility service remains active, immediately report to DISD Sustainability via Bond PM.

Water Shut-off Guidelines

Notification To:

- ✓ Dallas ISD Quadrant Supervisor
- ✓ Dallas ISD Department Supervisor
- ✓ Affected Dallas ISD Departments & Confirmation of readiness (Including but not limited to HVAC, Kitchen, Fire Suppression, etc.)
- ✓ Dallas ISD Sustainability Manager and/or Technician

Content of Notification:

- ✓ Signed Authorization form-DISD PM.
- ✓ Type of Shutdown: Emergency, Minor, Complete, Relocation.
- ✓ Meter number (if applicable).
- ✓ Area affected, Duration, and Contingency Plan
- ✓ SPA-Cover Letter Authorized by GC Safety Representative
- ✓ When relocating a utility, DISD Sustainability department must be notified.

Dallas ISD Plumbing Department:

- Department Manager: Bart Braswell
- SE Quad Supervisor: Jesse Rincon
- SW Quad Supervisor: James Baker
- NE Quad Supervisor: Justin Morris
- NW Quad Supervisor: David Martin
- Sustainability Department Manager: Bryant Shaw
- Sustainability Department Technician: Stephanie Garcia

Re-pressurizing:

- ✓ Include City Inspection
- ✓ Contractor to provide post inspection along with photos to DISD Plumbing Manager

Gas Shut-off Guidelines

Notification To:

- ✓ Quadrant Supervisor
- ✓ Department Manager
- ✓ Affected Departments & Confirmation of readiness (Including but not limited to HVAC, Kitchen, etc.)
- ✓ Dallas ISD Sustainability Manager and/or Technician

NOTE: When adding HVAC units, Project AE approval of increased load is expected.

Content of Notification:

- ✓ Signed Authorization form-DISD PM.
- ✓ Type of Shutdown: Emergency, Minor, Complete, Relocation.
- ✓ Meter number (if applicable).
- ✓ Area affected, Duration, and Contingency Plan
- ✓ SPA-Cover Letter Authorized by GC Safety Representative
- ✓ When relocating a utility, DISD Sustainability department must be notified.

Re-pressurizing:

- ✓ Include City Inspection
- ✓ Contractor to provide post inspection along with photos to DISD Plumbing Manager

Sanitary Sewer Guidelines

Notification To:

- ✓ Quadrant Supervisor
- ✓ Department Manager
- ✓ Dallas ISD Sustainability Manager and/or Technician

Content of Notification:

- ✓ Signed Authorization form-DISD PM
- ✓ Type of Shutdown: Emergency, Minor, Complete
- ✓ Meter number (if applicable)
- ✓ Area affected, Duration, and Contingency Plan
- ✓ SPA-Cover Letter Authorized by GC Safety Representative
- ✓ PMF PM to provide a Post Audit to DISD Plumbing Manager
- ✓ Include Pictures of tie-in
- ✓ Include City Inspection for all work.

Tie-In Guidelines:

- ✓ PMF PM to provide post inspection of service to DISD Plumbing Manager.

Electrical Shutdown Guidelines

Notification To: [Prior to Shut down and after restoration of service]

- ✓ ONCOR (if applicable)
- ✓ DISD Electrical Quadrant Supervisor
- ✓ DISD Electrical Department Supervisor
- ✓ MEP Director
- ✓ Dallas ISD Sustainability Manager and/or Technician.
- ✓ Affected Departments & Confirmation of readiness (HVAC, Kitchen, IT, Building Security, Fire Alarm, etc.)

Dallas ISD Electrical Department:

- Department Director: Bart Webster
- Department Manager: George Lakes
- NW Supervisor: Ainsworth, Steven
- NE Supervisor: Kevin T Liles
- SE Supervisor: Douglas Hall
- SW Supervisor: Jim Ward

Dallas ISD Sustainability Department:

- Sustainability Department Manager: Bryant Shaw
- Sustainability Department Technician: Stephanie Garcia

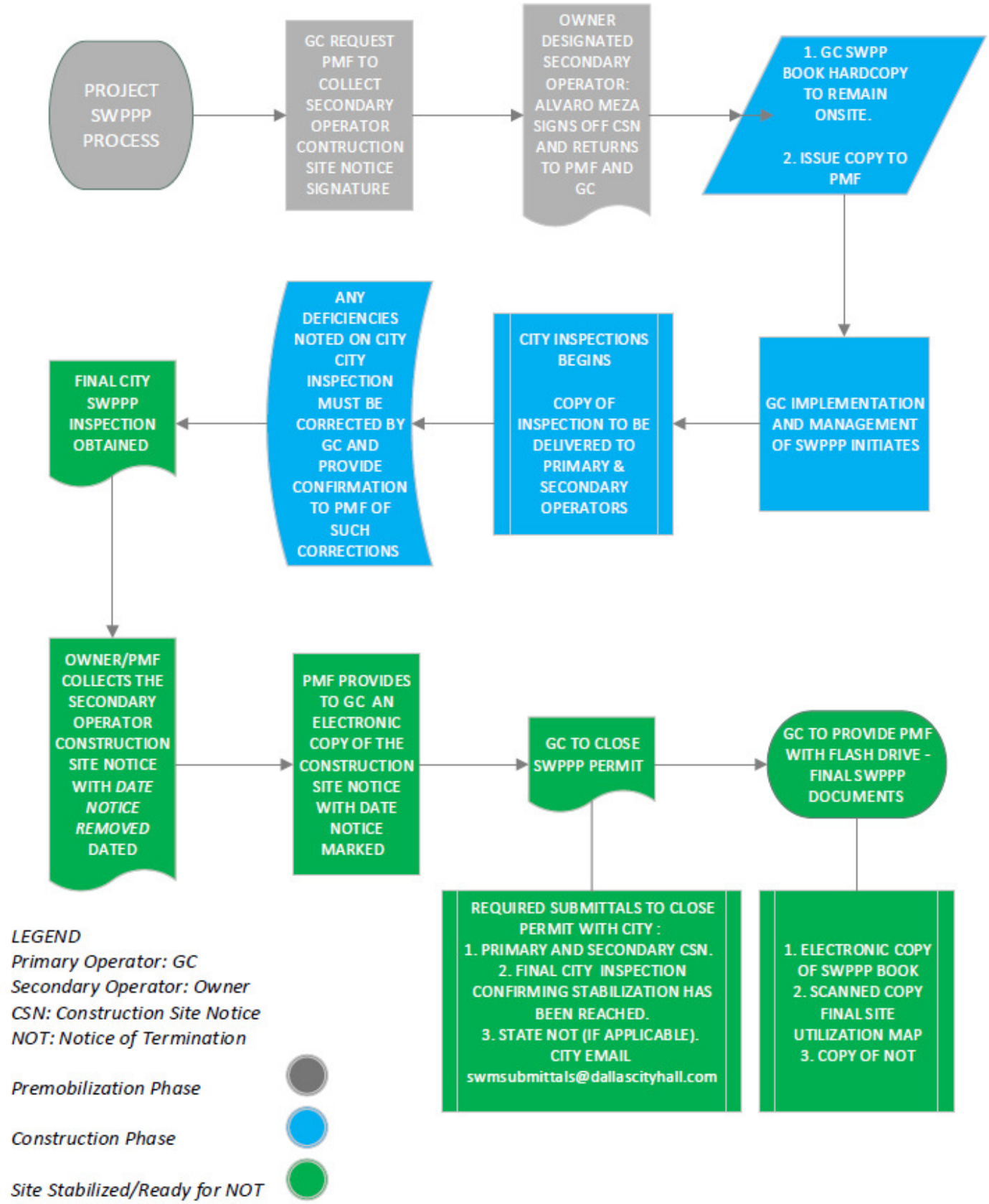
Content of notification:

- ✓ Signed Authorization form-DISD PM
- ✓ Type of Shutdown: Emergency, Minor, Complete
- ✓ Meter number (if applicable)
- ✓ When relocating a utility, DISD Sustainability department must be notified
- ✓ Area affected, Duration, and Contingency Plan
- ✓ SPA-Cover Letter Authorized by GC Safety Representative
- ✓ Complete-Shutdowns-

Re-energizing:

- ✓ Quadrant Supervisor
- ✓ Department Supervisor
- ✓ Affected Departments & Confirmation of readiness (HVAC, Kitchen, IT, Building Security, Fire Alarm, etc.)
- ✓ Electrical Contractor to gradually increase power

SWPPP Oversight Flowchart



Greenfield Shutdown Authorization Request Guidelines

See below set of guidelines for greenfield projects requesting permanent utility shutdown:

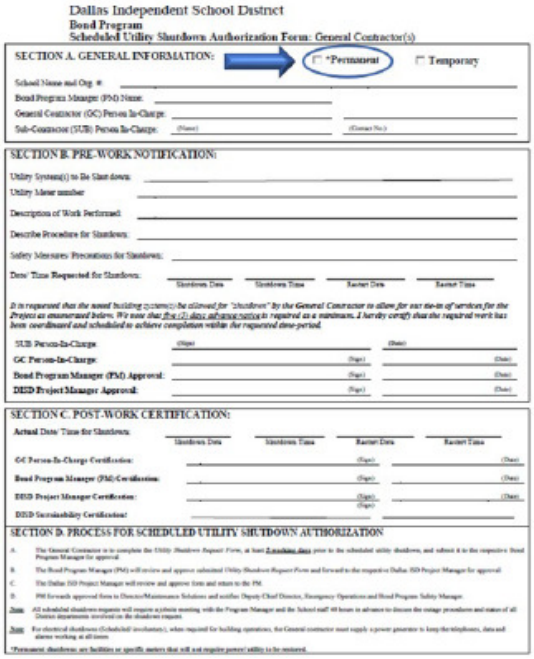
1. **Utility Shutdown request should select PERMANENT on the top right portion of our authorization form. (See below sample)**

2. **General Contractor (GC) responsible to provide power for the duration of the project.**

3. **Once the project reaches substantial completion, the GC/PMF to provide the Dallas ISD Sustainability Department with a copy of the GC utility bills to transfer the utility service to Dallas ISD.**

If you have any questions, please reach out to Dallas ISD Sustainability Department: sg9453@dallasisd.org

Note:
- Before demolishing a portable and/or building all meters numbers should be provided to DISD sustainability department to closed account and have the meters removed through the Owner provider.
- Please be reminded there is a "Minimum of 10-day(s) advance notice" for utilities.
It is very important that ALL Utility Accounts are closed through sustainability to prevent the GC reimbursing the district.
- Lastly, DISD is not responsible to provide GC utilities on Greenfield Locations.



Dallas Independent School District
Bond Program
Scheduled Utility Shutdown Authorization Form: General Contractor(s)

SECTION A. GENERAL INFORMATION: ☐ *Permanent ☐ Temporary

School Name and Org. #:
Bond Program Manager (PM) Name:
General Contractor (GC) Person In-Charge:
Sub-Contractor (SUB) Person In-Charge: (Name) (Contact No.)

SECTION B. PRE-WORK NOTIFICATION:

Utility System(s) to Be Shut down:
Utility Meter number:
Description of Work Performed:
Describe Procedure for Shutdown:
Safety Measures/ Precautions for Shutdown:
Date/ Time Requested for Shutdown: Shutdown Date / Shutdown Time / Restart Date / Restart Time

It is requested that the named building systems/s be allowed for "shutdown" by the General Contractor to allow for our tie-in of services for the Project as enumerated below. We note that five (5) days advance notice is required as a minimum. I hereby certify that the required work has been coordinated and scheduled to achieve completion within the requested time-period.

SUB Person-In-Charge: (Sign) (Date)
GC Person-In-Charge: (Sign) (Date)
Bond Program Manager (PM) Approval: (Sign) (Date)
DISD Project Manager Approval: (Sign) (Date)

SECTION C. POST-WORK CERTIFICATION:

Actual Date/ Time for Shutdown: Shutdown Date / Shutdown Time / Restart Date / Restart Time

GC Person-In-Charge Certification: (Sign) (Date)
Bond Program Manager (PM) Certification: (Sign) (Date)
DISD Project Manager Certification: (Sign) (Date)
DISD Sustainability Certification: (Sign)

SECTION D. PROCESS FOR SCHEDULED UTILITY SHUTDOWN AUTHORIZATION

A. The General Contractor is to complete the Utility Shutdown Request Form, at least 5 working days prior to the scheduled utility shutdown, and submit it to the respective Bond Program Manager for approval.
B. The Bond Program Manager (PM) will review and approve submitted Utility Shutdown Request Form and forward to the respective Dallas ISD Project Manager for approval.
C. The Dallas ISD Project Manager will review and approve form and return to the PM.
D. PM forwards approved form to Director/Maintenance Solutions and notifies Deputy Chief Director, Emergency Operations and Bond Program Safety Manager.

Note: All scheduled shutdown requests will require a phone meeting with the Program Manager and the School staff 48 hours in advance to discuss the outage procedures and status of all District departments involved on the shutdown request.

Note: For electrical shutdowns (Scheduled/ involuntary), when required for building operations, the General contractor must supply a power generator to keep the telephones, data and alarm working at all times.

*Permanent shutdowns are facilities or specific meters that will not require power/ utility to be restored.

AGENDA FOR CAMPUS SECURITY MEETING

Sign-in Sheet

- ✓ All personnel in attendance must sign-in

Welcome

- ✓ Purpose of the Meeting – To Review the Requirements Regarding Intruder Detection and Campus Security.

Intruder Detection

- ✓ All visitors must enter through the campus' secured entry point
- ✓ Immediately report any suspicious activity to the Project Management Team
- ✓ Always be alert – See Something, Say Something, Do Something
- ✓ Stop any individuals in your building who do not display a District Badge or Visitor Badge and escort them to the main office.

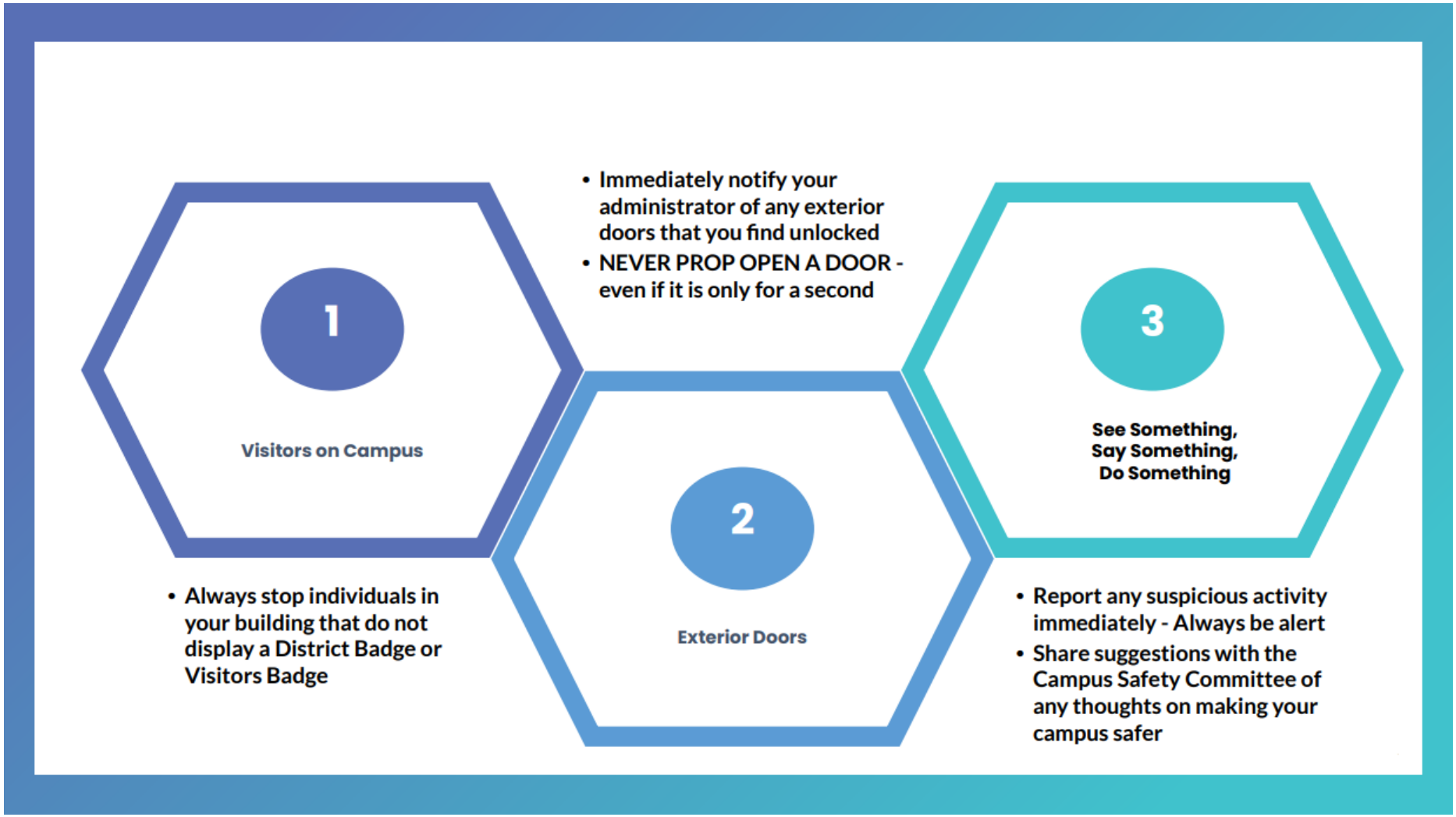
Propped Doors and Secured Areas

- ✓ **NEVER** prop open a door for any reason
- ✓ All exterior doors must remain locked at all times
- ✓ All interior doors leading into construction areas must remain locked at all times
- ✓ Portable doors are considered exterior doors and must be locked at all times
- ✓ Immediately notify the Project Management Team of any exterior door that you may find unlocked or propped open

Questions and Answers:

Note for General Contractors: All locked doors leading into construction areas and/or restricted pathways must be communicated with the campus Principal and Fire Marshal to ensure restrictions and/or physical alterations of any kind do not conflict with Campus Emergency Action Plans, Emergency Egress and NFPA 101 Life Safety Codes.

Campus Security Reminders



Safety Meeting Sign-in Sheet

DATE: _____ PROJECT: _____

CONTRACTOR:_____

Foreman's Signature:_____

Safety Representative:_____

TOPICS DISCUSSED:_____

NAME – PRINTED	SIGNATURE	COMPANY
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		

Geotechnical Soil Sampling Safety Guidelines

General Information:_____

School Name and Org #:_____

Bond Program Manager: _____

Company Name: _____ Supervisor: _____Cell Phone_____

Scope: _____Boring Map Location Attached: [circle] YES or NO

Mobilization Date: _____ Demobilization Date: _____Work Hours: _____

Minimum Drilling Safety Guidelines:

1. ALL crew members must be properly badged.
2. Schedule site access through your Dallas ISD Project Manager
3. [If Applicable] Pre-approved signed forms for custodial overtime may apply. Please confirm with your Dallas ISD PM.
4. During arrival, check in at the front office with badge displayed in the upper body and face cover.
5. Drill Rig must be barricaded and NOT be operated in occupied school areas.
6. Before any excavation is started, should contact 811 DIG-TESS for confirmation, Ground penetrating radar (GPR), review of existing plans, and any other reasonable efforts shall be made to determine if any underground utilities (i.e.: power lines, water lines, fuel lines, etc.) are present within the boundaries of the proposed work area. As the excavation work approaches the location of any known utilities, the lines shall be uncovered, using extreme caution not to disturb the lines, and adequate measures shall be taken to protect the lines from damage while the work progresses.
7. Any disturbed areas must be returned to existing and safe condition prior to departure.
8. Damage to property-Injuries Beyond First Aid must be immediately reported to Alvaro Meza 214-435-2204 and your Dallas ISD Project Manager.

NOTE: This Document is intended to provide a working, uniform minimal level of program guidelines to assist or provide direction to the Contractors. This Document is not intended to replace the need for each Contractor to establish and maintain a proper Illness and Injury Prevention Program as required by the Department of Labor, Occupational Safety and Health Act (29 CFR 1926 and 29 CFR 1910) and the State of Texas.

Inclement Weather Plan of Action

General Guidelines
PMFs are required to notify and coordinate with the GCs to take proactive steps during inclement weather events. •Construction Services may schedule a coordination call prior to any severe weather event with PMF (in a group call or individually- These calls or meetings may be on a regular or impromptu basis as needed) to share information about projects with medium/high probability of damage to property or interruption to school operations. The intent is to provide Construction Services a complete situational awareness of a school's readiness for return of students, and to eliminate or mitigate risk to DISD's facilities.

PRIOR to Inclement Weather Event:
For projects under construction PMF to provide a report to DISD Construction Services any conditions that may impact campus occupancy or function.
Coordination with DISD Maintenance (Managers and Supervisors) and Custodial Services (campus, and supervisors), along with Principals is REQUIRED. Be prepared to report this coordination.

POST Inclement Weather Event:
•PMFs to conduct a field verification and begin the mitigation phase.
•Work with contractors and appropriate maintenance personnel to create a recovery plan
•Provide Construction Services a real time update - by campus- on said issue(s)•Reporting shall continue as needed till mitigation is completed.

Return of Students and Staff
•PMF Leadership or designee to coordinate with campus Principal and Facility Supervisor. iffeasible, PMF Project Manager will be on site for that morning to confirm good working schooloperations.

Sample Reporting
•013-FD Roosevelt – No issues to report
•013-FD Roosevelt- 2. Campus has an issue – Provide detailed description and mitigation.

The intent of this document is to establish a minimum level of proactive steps/reporting, but not be completely inflexible.
After Action Reviews or a Root Cause Analysis may be required. Information should be captured to support these events

[End of Document]

DISD 2020 Bond – General Contractor

Step One: Set up your project account with Field Control Analytics formerly FC Construction Services

- Visit **www.fcbackground.com/clientsignup/**
  (Internet Explorer 5.0 or higher required)
- Enter your Project Pass Code: **DI20SC21**

EXISTING CUSTOMERS: You will be required to provide login credentials to complete signup. If you do not know your login credentials contact Customer Support @ customer.support@fieldca.com

You will be required to provide the following information. You will be unable to complete signup without all.

- Billing address and contact information
- Contact information for all authorized users
- Name and contact information for the company that hired you (Prime Contractor)
- Credit card information for payment

ALLOW TWO FULL BUSINESS DAYS FOR ACCOUNT SETUP COMPLETION AND NOTICE TO CLIENT/EMPLOYER

Step Two: Initiate Project Drug Testing, Background Check, and Badging

DISD 2020 Bond - $74.50 *(see Pricing Agreement for details)*
Replacement Badge Fee – $25.00 * Enrollment Fee - $50.00

1. Upon setup completion, contractor receives **Web Instructions** to download/print **Consent Document**.
2. Consent Document. ($25.00 handling fee for employees without a properly authorized Consent Document. No appointment necessary and maps are available online.)
3. Most results are available within one business day, but may take up to three. Authorized users will receive an e-mail notification when report results are available.
4. DISD badges will be printed and available for pickup at the facility selected during project setup.

Other Important Information

- FCA notifies your General Contractor of all unpaid invoices.
- If a worker fails a drug test, he/she will not be authorized to work for the duration of the project.

Background checks and badging requires one of the following identification sources of a person:

- Current U.S. Driver's License
- U.S. Birth Certificate (along with photo id)
- Current US Passport
- U.S. Citizenship Naturalization
- Foreign Passport
- U.S. issued photo ID Card
- Temporary identification card
- Resident Visa
- Employment Visa

Acceptable forms of ID do not include the non-US issued Matricula Card.

DISD 2020 Bond Badge Qualifications:

- Negative drug test result
- No felony convictions, no open or pending felony cases for crimes against a minor (no time limit)
- No felony convictions, no open or pending felony cases for crimes against a person (25 years)
- No felony convictions, no open or pending felony cases (7 years)
- No misdemeanor crimes (see misdemeanor offenses below). Misdemeanor records are limited to the previous 7-years.
- No registered sex offenders
- No outstanding warrants for crimes that would disqualify an individual from receiving a badge

Misdemeanor Offenses Include the following:

Possession of a Prohibited Weapon
Unlawful Carrying Weapon
Purchase/Furnish Alcohol to Minor
Assault Causes Bodily Injury
Terroristic Threat
Enticing a Child
Harboring Runaway Child
Violation of a Protective Order
Criminal Mischief
Burglary
Shoplifting
Theft
Larceny
Fraud
Forgery
Passing Forgery Writing
Fleeing from Police Officer
Leaving Scene of Accident
Failure to Stop and Give Information
Fail to Identify Giving False/Fictitious Info
Resisting Arrest
Evading Arrest/Detention
Escape from Custody
Interference with Public Duties
Disorderly Conduct
Interference with Emergency Call
Harassment
Prostitution

FCA Client Support Team
Phone: (972) 404-4479
Monday - Friday 6:00am – 6:00pm CST
customer.support@fieldca.com

DISD 2020 Bond – Professional Services

Step One: Set up your project account with Field Control Analytics formerly FC Construction Services

- Visit **www.fcbackground.com/clientsignup/**
  (Internet Explorer 5.0 or higher required)
- Enter your Project Pass Code: **DI20PS21**

EXISTING CUSTOMERS: You will be required to provide login credentials to complete signup. If you do not know your login credentials contact Customer Support @ customer.support@fieldca.com

You will be required to provide the following information. You will be unable to complete signup without all.

- Billing address and contact information
- Contact information for all authorized users
- Name and contact information for the company that hired you (Prime Contractor)
- Credit card information for payment

ALLOW TWO FULL BUSINESS DAYS FOR ACCOUNT SETUP COMPLETION AND NOTICE TO CLIENT/EMPLOYER

Step Two: Initiate Project Drug Testing, Background Check, and Badging

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3. Most results are available within one business day, but may take up to three. Authorized users will receive an e-mail notification when report results are available.
4. DISD badges will be printed and available for pickup at the facility selected during project setup.

Other Important Information

- FCA notifies your General Contractor of all unpaid invoices.
- If a worker fails a drug test, he/she will not be authorized to work for the duration of the project.

Background checks and badging requires one of the following identification sources of a person:

- Current U.S. Driver's License
- U.S. Birth Certificate (along with photo id)
- Current US Passport
- U.S. Citizenship Naturalization
- Foreign Passport
- U.S. issued photo ID Card
- Temporary identification card
- Resident Visa
- Employment Visa

Acceptable forms of ID do not include the non-US issued Matricula Card.

DISD 2020 Bond Badge Qualifications:

- Negative drug test result
- No felony convictions, no open or pending felony cases for crimes against a minor (no time limit)
- No felony convictions, no open or pending felony cases for crimes against a person (25 years)
- No felony convictions, no open or pending felony cases (7 years)
- No misdemeanor crimes (see misdemeanor offenses below). Misdemeanor records are limited to the previous 7-years.
- No registered sex offenders
- No outstanding warrants for crimes that would disqualify an individual from receiving a badge

Misdemeanor Offenses Include the following:

Possession of a Prohibited Weapon
Unlawful Carrying Weapon
Purchase/Furnish Alcohol to Minor
Assault Causes Bodily Injury
Terroristic Threat
Enticing a Child
Harboring Runaway Child
Violation of a Protective Order
Criminal Mischief
Burglary
Shoplifting
Theft
Larceny
Fraud
Forgery
Passing Forgery Writing
Fleeing from Police Officer
Leaving Scene of Accident
Failure to Stop and Give Information
Fail to Identify Giving False/Fictitious Info
Resisting Arrest
Evading Arrest/Detention
Escape from Custody
Interference with Public Duties
Disorderly Conduct
Interference with Emergency Call
Harassment
Prostitution

FCA Client Support Team
Phone: (972) 404-4479
Monday - Friday 6:00am – 6:00pm CST
customer.support@fieldca.com

DISD 2020 Bond - Subcontractor

Step One: Set up your project account with Field Control Analytics formerly FC Construction Services

- Visit **www.fcbackground.com/clientsignup/**
  (Internet Explorer 5.0 or higher required)
- Enter your Project Pass Code: **DI20SC21**

EXISTING CUSTOMERS: You will be required to provide login credentials to complete signup. If you do not know your login credentials contact Customer Support @ customer.support@fieldca.com

You will be required to provide the following information. You will be unable to complete signup without all.

- Billing address and contact information
- Contact information for all authorized users
- Name and contact information for the company that hired you (Prime Contractor)
- Credit card information for payment

ALLOW TWO FULL BUSINESS DAYS FOR ACCOUNT SETUP COMPLETION AND NOTICE TO CLIENT/EMPLOYER

Step Two: Initiate Project Drug Testing, Background Check, and Badging

DISD 2020 Bond - $74.50 *(see Pricing Agreement for details)*
Replacement Badge Fee – $25.00 * Enrollment Fee - $50.00

1. Upon setup completion, contractor receives **Web Instructions** to download/print **Consent Document**.
2. Consent Document. ($25.00 handling fee for employees without a properly authorized Consent Document. No appointment necessary and maps are available online.)
3. Most results are available within one business day, but may take up to three. Authorized users will receive an e-mail notification when report results are available.
4. DISD badges will be printed and available for pickup at the facility selected during project setup.

Other Important Information

- FCA notifies your General Contractor of all unpaid invoices.
- If a worker fails a drug test, he/she will not be authorized to work for the duration of the project.

Background checks and badging requires one of the following identification sources of a person:

- Current U.S. Driver's License
- U.S. Birth Certificate (along with photo id)
- Current US Passport
- U.S. Citizenship Naturalization
- Foreign Passport
- U.S. issued photo ID Card
- Temporary identification card
- Resident Visa
- Employment Visa

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- No felony convictions, no open or pending felony cases (7 years)
- No misdemeanor crimes (see misdemeanor offenses below). Misdemeanor records are limited to the previous 7-years.
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- No outstanding warrants for crimes that would disqualify an individual from receiving a badge

Misdemeanor Offenses Include the following:

Possession of a Prohibited Weapon
Unlawful Carrying Weapon
Purchase/Furnish Alcohol to Minor
Assault Causes Bodily Injury
Terroristic Threat
Enticing a Child
Harboring Runaway Child
Violation of a Protective Order
Criminal Mischief
Burglary
Shoplifting
Theft
Larceny
Fraud
Forgery
Passing Forgery Writing
Fleeing from Police Officer
Leaving Scene of Accident
Failure to Stop and Give Information
Fail to Identify Giving False/Fictitious Info
Resisting Arrest
Evading Arrest/Detention
Escape from Custody
Interference with Public Duties
Disorderly Conduct
Interference with Emergency Call
Harassment
Prostitution

FCA Client Support Team
Phone: (972) 404-4479
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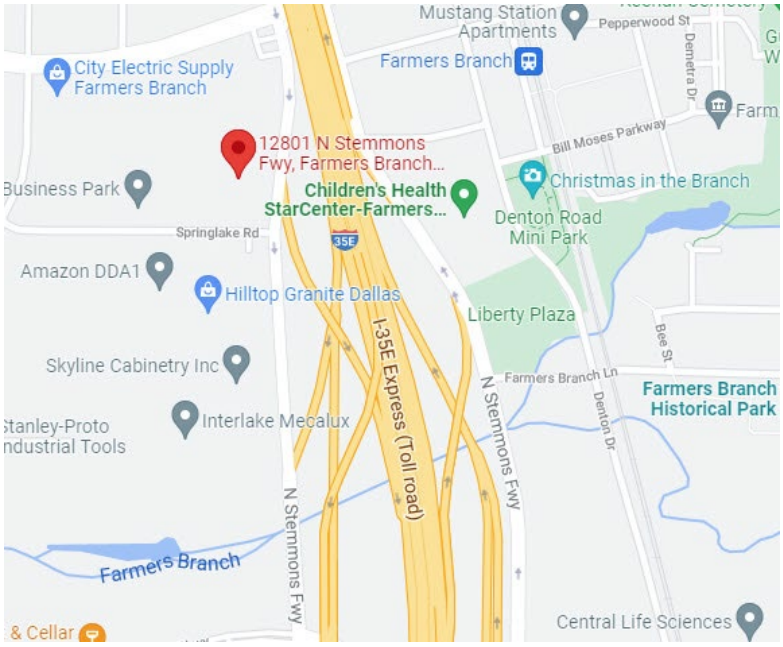
FCA EXPRESS - DALLAS SCREENING & BADGING FACILITY

ADDRESS

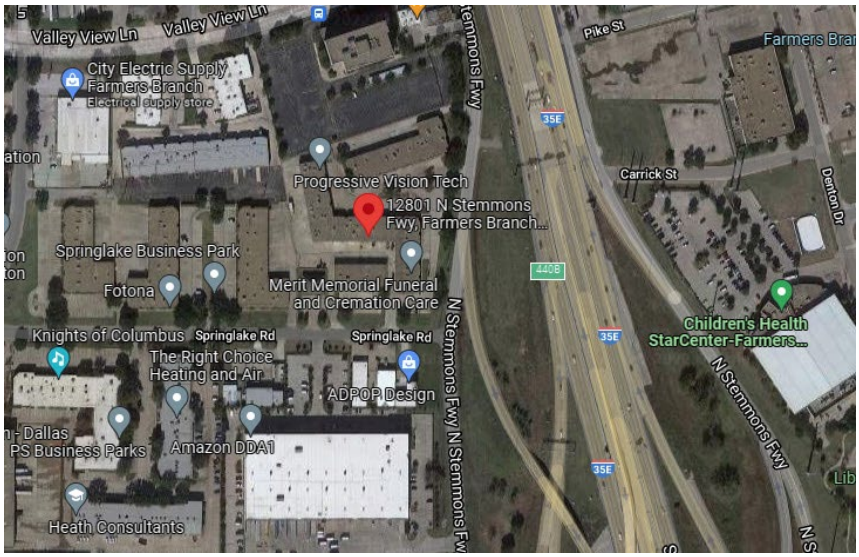
12801 N. Stemmons Frwy.
Ste. 807
Farmers Branch, TX 75234
Phone: 833.227.0637;
option 2
Hours: 7:30am - 4:30pm
Monday - Friday

OPENING FEBRUARY 14, 2022

Scan the QR code for instant directions!



Scan the QR code to contact us!



All FCA Express locations can process screens that require a background, drug test and badge.

www.fieldcontrolanalytics.com | 800-388-88827

SECTION 01 10 00 – SUMMARY OF WORK

PART 1 - GENERAL

1.1 Related Documents

Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 Summary

A. Section includes:
1. Project information
2. Work covered by Contract Documents
3. Phased construction
4. Access to site
5. Coordination with occupants
6. Work restrictions

B. Related Sections:
1. Division 00 Section 00 31 00 Available Project Information
2. Division 00 Section 00 31 18 School Operations Parameters Statement
3. Division 01 Section 01 50 00 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities
4. Division 01 Section 01 52 14 “Temporary Facilities for Students” for specifications and procedures regarding the use of temporary swing space that the Contractor may furnish and install to accommodate the Work

1.3 Project Information

A. Refer to Section 00 31 00

1.4 Scope of Work. The Work consists of:

ORG 023 – DAVID W. CARTER HIGH SCHOOL
Project consists of the following:
1. Addition:
   a. New 8,000 sf attached addition
   b. New dance room and black box
   c. New MEP and Fire Safety items.
2. Demolition of select flatwork and build back.
3. Minor interior renovation of existing high school.
   a. Areas to be affected will be corridors, new wall finishes, ceilings, and lighting fixtures.
   b. Existing HVAC, fire alarm and sprinklers to remain but will be relocated and extended to new surfaces as needed.

1.5 Multiple Project Site Representation for Bid Packages. If multiple project sites are identified in the Work, the contractor shall employ and designate one qualified full-time Superintendent who shall over-see the performance on each individual project site within the bid package, for the duration of the project. Any deviation from this will need to be approved by DISD and the Program Manager.

1.6 Schedule of Values for Bid Packages. If multiple project sites are identified in the Work, the contractor shall provide one Schedule of Values for each project site attached to each application for payment. In addition, each school site shall have a separate schedule of values in the CSI format followed in the bid documents, identifying the labor and material components separately. Projects that have both Renovation and Addition scope shall have a sub-total for each of these two categories, within the Schedule of Values.

1.7 Concurrent Construction for Bid Packages. Work (additions and renovations) at each school site will be performed concurrently with the other school sites unless otherwise indicated by DISD.

1.8 Phasing. Since the school buildings will be in use during construction, the Work shall be conducted in such a manner as to not interrupt or disturb school activities. **THE PHASING PLANS ARE GUIDELINES AND ARE USED TO IDENTIFY A POSSIBLE APPROACH TO THE WORK. THE CONTRACTOR MAY SUBMIT A PHASING PLAN. ANY DEVIATION FROM THE SUGGESTED PLAN CONTAINED IN THE CONTRACT DOCUMENTS MUST BE APPROVED BY THE A/E, PROGRAM MANAGER, AND PRINCIPAL PRIOR TO IMPLEMENTATION.**

A. Temporary classroom space (Swing Space) if needed, **shall be provided by the Contractor**. The Contractor will be responsible for all associated planning, permitting, scheduling, installation, removal, site restoration, coordination and costs associated with providing temporary space for classrooms. Temporary classroom space will be in accordance with Section 01 52 14 - TEMPORARY FACILITIES FOR STUDENTS.

B. The Contractor may submit, as part of the proposal, optional phasing plans that can potentially save the District time and money.

C. Some work may need to be performed after normal school operating hours, nights and weekends. A DISD representative must be present at the school during times that the Contractor is working at the school site. The Owner will incur overtime costs for DISD staff presence at the school site outside normal hours of school operation, including weekends and holidays. Such overtime costs incurred will be the financial responsibility of the General Contractor and will be credited to the Owner in a manner to be determined by the DISD and the Program Manager.

D. Refer to the School Operations Parameter Statement Section for details of the regular working hours, holidays and procedures for custodial overtime, etc.

E. Work cannot start in a particular Phase until students/staff have been relocated to the designated Swing Space (either in the existing building or in Temporary Buildings outside) or until there is an arrangement in place for alternate shift work involved.

1. Close coordination with the A/E, Program Manager, and the School Staff, will be required of the Contractor.

F. Certain areas included in the Contractor's scope of work may contain furniture, boxes, etc. Protection of these contents is the responsibility of the Contractor.

G. Refer to Construction Documents for additional Phasing information.

1.9 HVAC and Water Treatment Requirements. Contractor will coordinate with DISD for water treatment and HVAC maintenance. Please refer to the plumbing and mechanical specifications for the contractor's responsibilities related to these requirements.

1.10 Phase Acceptance. Upon certification by the Contractor and recommendation of the A/E, DISD will accept the Work of each individual phase as it is completed. Architectural acceptance shall be called "phase acceptance". The HVAC, electrical, plumbing and roofing systems will be accepted by DISD when the entire project has been completed; at that point, upon completion of all relevant contractual requirements, DISD will issue substantial completion. The contractor will operate and maintain the HVAC, electrical and plumbing systems that are a part of his scope of work until substantial completion. The

contractor's warranty for any new HVAC, electrical, plumbing and roofing systems shall commence at substantial completion for each school project. The contractor will install new filters and record date of replacement on each filter upon substantial completion.

1.11 Use of Technology for Project Management. DISD will furnish information related to accessing web-enabled project management applications for this contract. DISD and the Program Manager will implement project management software, that will be easily accessible through the Internet. Contractor will cooperate with the Program Manager for the implementation and use of this tool.

Contractor will be required to create and post several types of documents into the web-enabled project management software via the Internet. Request for Information (RFIs) will be posted by the Contractor and responded to by the A/E(s) in the software via the Internet, thereby facilitating communication among all parties and expediting resolution of issues. A/E responses to RFIs will not be considered official and are still subject to revision until the Program Manager has approved the response in the software . Any meeting minutes and field reports required to be created by the Contractor or A/E(s) will be posted to the software. DISD and the Program Manager reserve the right to require additional documents to be entered into the software at their discretion.

1.12 Permitting. Contractors are responsible for the costs of acquiring the building permit at standard City of Dallas rates.

1.13 Storm Water Pollution Prevention Plan. Once the Notice to Proceed has been issued, the Contractor is obligated to comply with the applicable municipalities and applicable SWPPP codes and protocol. The Contractor assumes full responsibility for any complaints, citations, maintenance and complete management of the SWPPP plan including any and all documentation. For new schools with demolition scope by a separate contractor, Contractor shall coordinate with the separate contractor for a seamless transfer / transition of an existing SWPPP. Contractor will then submit all documentation to the District at closeout.

1.14 Construction Specification Index. All construction documentation will follow the Construction Specification Index format followed by the construction bid documents.

1.15 The contractor shall tag locations of all equipment within the scope of work by securing a plastic tag on the appropriate ceiling grid locations. This will assist easy identification of the equipment to DISD maintenance staff. The contractor will install stickers on all equipment provided indicating the warranty dates/periods and the contact information.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00

SECTION 01 21 00 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements governing allowances.

1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to the Contractor. Refer to the AIA 201 General conditions for additional requirements concerning allowances,

2. All lump-sum and Owner Controlled Allowances are within the Contract Sum, and shall be covered by the bonds, insurance, general conditions, overhead, profit and all other costs so that the totals represented by the Allowances are available without additional charge or cost to the Owner.

B. Types of allowances include the following:

1. Lump-sum allowances.
2. Owner Controlled Contingency allowances.

C. Related Sections:
1. Division 00, File 00 41 11 - Proposal Form - Base Bid.
2. Division 01, File 01 22 00 - Unit Prices (for procedures for using unit prices)
3. Divisions 02 through 49 (or as applicable) Sections for items of Work covered by allowances.

1.3 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, Contractor shall advise Architect and Program Manager of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

B. At Architect's or Program Manager’s request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Once the proposal is approved by the Owner, purchase products and systems selected by Architect from the designated supplier.

1.4 SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Allowance Expenditure Request Authorization (AERA).

B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

C. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.

D. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.5 COORDINATION

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.6 ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include freight, insurance, and delivery to Project site.

B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.7 ADJUSTMENT OF ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, prepare a proposal based on the difference between purchase amount and the allowance.

1. Include installation costs in purchase amount only where indicated as part of the allowance.
2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
3. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

B. Schedule of Allowances is included in section 00 41 11

END OF SECTION 01 21 00

SECTION 01 22 00 - UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for unit prices.

B. Related Sections:

1. Division 00 Section 00 41 12 Proposal Form – Alternates and Unit Pricing.
2. Division 01 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
3. Division 01 Section "Quality Requirements" for general testing and inspecting requirements (File: 01 40 00)

1.3 DEFINITIONS

A. Unit price is an amount incorporated in the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are either increased or decreased.

1.4 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, overhead, and profit.

B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

C. If the quantities of the items listed in the Schedule of Unit Prices are increased, the Unit Prices set forth by the Contractor in Section 00 41 12 shall apply to such increased quantities. Unit Prices for adjusting the Contract Sum for less work or material installation will be 95% of these amounts.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

3.1 SCHEDULE OF UNIT PRICES

Refer to section 00 41 12 for Schedule of Unit Prices.

END OF SECTION 01 22 00

SECTION 01 23 00 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by Proposers and stated on the Proposal Form for certain work defined in the Proposal Requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.

2. The cost or credit for each alternate is the total addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum. Pricing for alternates may not be submitted or listed in the form of an allowance amount on the proposal form.

1.4 PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

2. Cost listed for each Alternate includes cost of related coordination, modification or adjustment.

B. Notification: Immediately following award of the Contract, Contractor shall prepare and distribute to each entity or person to be involved in the performance of the Alternate Work, a notification of the status of each Alternate scheduled herein. Indicate which alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates if any.

C. Execute accepted alternates under the same conditions as other work of the Contract.

D. Contractor shall be responsible for any changes in the Work affected by acceptance of Alternates. Claims for additional costs or time extensions resulting from changes to the Work as a result of the Owner’s election of any or all Alternates will not be allowed.

E. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Refer to section 00 41 12 for Schedule of Alternates

END OF SECTION 01 23 00

SECTION 01 25 00 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Sections:

1. Division 01 Section "Allowances" for products selected under an allowance.
2. Division 01 Section "Alternates" for products selected under an alternate.
3. Division 01 Section "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.
4. Divisions 02 through 49 Sections for specific requirements and limitations for substitutions.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor and Owner.

1.4 SUBMITTALS

A. Substitution Requests: Submit five (5) copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include related Specification Section number and title, Drawing numbers and titles and complete documentation for substitution. Include the following information with each request:
1. Certification by the Contractor to the effect that, in the Contractor’s opinion, after thorough evaluation, the proposed substitution will result in work that in every significant respect is equal to or better than the work required by the Contract Documents, and that it will perform adequately in the application indicated.
a. Include in a certification the Contractor’s waiver of right to additional payment or time, which may subsequently be necessary because of the failure of the substitution to perform adequately.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.

b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable specification section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project, from IBC.
j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any.

3. Approval: If necessary, Architect will request additional information or documentation for evaluation within a reasonable amount time from receipt of a request for substitution. Architect will recommend to the Program Manager acceptance or rejection of proposed substitution within a reasonable amount of time from receipt of all required documentation. Program Manager will recommend to the District acceptance or rejection of proposed substitution within a reasonable amount of time from receipt of all required documentation. Upon recommendation from the Program Manager, the District will provide acceptance or rejection of proposed substitution within a reasonable amount of time from receipt of all required documentation.
   a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work with Program Manager and Owner written approval.
   b. Rejection will include a statement giving reason for rejection.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Modify or adjust affected work as necessary to integrate work of the approved substitutions.

B. The Owner may not consider the request if the Contractor cannot provide the product or method because of failure to pursue work promptly or coordinate activities properly.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

Approval process for both types of substitutions shall be as described above.

A. Substitutions for Cause: Submit requests for substitution immediately upon discovery of need for change, but not later than fifteen (15) days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Substitution request is fully documented and properly submitted.
c. Requested substitution will not adversely affect Contractor's construction schedule.
d. Requested substitution has received necessary approvals of authorities having jurisdiction.
e. Requested substitution is compatible with other portions of the Work.
f. Requested substitution has been coordinated with other portions of the Work.
g. Requested substitution provides specified warranty.
h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Architect will consider requests for substitution if received within twenty (20) days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect, only when there is an advantage to the Owner. The Owner may override rejections made by the Architect and request that the Program Managers make a determination as to whether the substitution shall be considered by the Architect.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
b. Requested substitution does not require extensive revisions to the Contract Documents.
c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
d. Substitution request is fully documented and properly submitted.
e. Requested substitution will not adversely affect Contractor's construction schedule.
f. Requested substitution has received necessary approvals of authorities having jurisdiction.
g. Requested substitution is compatible with other portions of the Work.
h. Requested substitution has been coordinated with other portions of the Work.
i. Requested substitution provides specified warranty.

j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

C. System Substitution: No changes should be anticipated in major building system types or approved manufactures in pricing of schedule; the Owner has standardized materials in place in existing buildings, and will not change for the convenience of the contractor.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 25 00

SECTION 01 29 00 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Provisions established within the General, Supplementary and Other Conditions of the Contract, Division 1 – General Requirements, and Drawings are collectively applicable to this Section.

1.02 SECTION INCLUDES

A. Procedures for preparation and submittal of Application for Payment.

1.03 RELATED SECTIONS/DOCUMENTS

A. General Conditions: Progress Payment, and Final Payment.

B. Section 01340 – Shop Drawings, Product Data and Samples

C. Section 01370 – Schedule of Values

1.04 FORMAT

A. AIA G702 – Application and Certificate for Payment

B. For continuation sheet, use AIA G703 in format at Section 01 29 73 for schedule of values.

1.05 PREPARTATION OF APPLICATIONS

A. Type required information or use media printout.

B. Execute certification by authorized officer.

C. Use data on accepted Schedule of Values. Provide dollar value in each column for each line item for portion of Work performed and for products.

D. List each authorized Change Order as an extension on continuation sheet, listing Change Order number and dollar amount as for original item of Work.

E. Prepare Application for Final Payment as specified by Program Manager.

F. Prepare one application with a schedule of values for each school with a breakdown in the CSI format followed by the bid documents.

G. Projects that have both Renovation and Addition scope shall have a sub-total for each of these two categories, within the Schedule of Values.

1.06 SUBMITTAL PROCEDURES

A. Schedule meeting (20) days prior to submitting first pay request, to review schedule with Architect, and Project Manager.

B. Submit one (1) original copy of each Application for Payment at times stipulated in Agreement.

C. Submit under transmittal letter.

D. Payment Period: Submit at intervals stipulated in the Agreement.

1.07 SUBSTANTIATING DATA

A. When Architect requires substantiating information, submit data justifying line item amounts in questions. On Owner controlled allowance items, submit actual invoices from supplier of product or service.

B. Provide one (1) copy of data with cover letter for each copy of submittal. Show Application number and date, and line item by number and description.

1.08 FORMAT AND SUBMITTAL REQUIREMENTS

A. Set-up format and submittal requirements include but are not limited to the following:
   a. Contractor must use AIA 702 and AIA 703 forms for Application for Payment.
   b. All values should be taken to the hundredth (penny).
   c. All items must be broken down by school, by addition/renovation (where applicable). This break down must match the breakdown as specified in the GC Contract or established with the Program Manager.
   d. All items must be organized by the CSI division.
   e. All items must be broken down by material and labor.
   f. All applicable CSI divisions must be sub-totaled.
   g. Each addition/renovation (where applicable) and school must be sub-totaled.
   h. The Owner's Contingency Allowance (O.C.A.) should occupy one line item at the bottom of each addition/renovation and match the amount specified in the GC contract. This line item should be separated from any other CSI division.
   i. All other contract allowances (pre-bid or post-bid) should be specified per the GC contract and included in CSI division 1.
   j. Contractor must include a summary by school, by addition/renovation (where applicable), at the end of AIA 703.
   k. General Conditions, P&P Bonds, Insurance, Fee, Building Permit, and Mobilization must be broken out and included in CSI division 1.

B. Post-set-up format and submittal requirements include but are not limited to the following:
   a. Contractor may not change the "scheduled values" after approval of the Schedule of Values (SOV) by the A/E, PM, and DISD (at first Application for Payment).
   b. Include DISD P.O. number on AIA 702.
   c. Include DISD P.O. number in application number. For example, "222123-3" would be the third Application for Payment for P.O. 222123.
   d. Certified by A/E.
   e. Previous invoice totals match previous invoice.
   f. Attach fully executed signature page when billing for any DISD-approved CAEAs.
   g. Attach fully executed signature page when billing for any DISD-approved AERAs.
   h. Attach fully executed signature page when billing for any DISD-approved CAELs.
   i. Attach fully executed signature page when billing for any DISD-approved Change Orders.
   j. Attach an M/WBE Pay Activity Report, signed or acknowledged by e-mail or waiver by all minority subcontractors. (Acknowledgment must include amount paid during current period.)
   k. Attach all Custodian Overtime Approval forms for the billing period, with a summary of OT hours to date for the project.
   l. Attach a complete project schedule for each project, updated for the billing period, with substantial completion dates per GC contract.
   m. Attach a Title Transfer Form insurance/bonding documents for storage facility for any material stored off-site, per GC contract.
   n. Attach "GC Application for Payment Review & Sign-Off" with GC signature signifying review of all Application for Payment elements.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION (Not Applicable)

END OF SECTION 01 29 00

SECTION 01 29 73 - SCHEDULE OF VALUES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Provisions established within the General, Supplementary and Other Conditions of the Contract, Division 1 – General Requirements, and the Drawings are collectively applicable to this Section.

1.02 REQUIREMENTS INCLUDED

A. Procedures for preparation and submittal of Schedule of Values.

1.03 RELATED SECTIONS/DOCUMENTS

A. General Conditions.

B. Section 01 29 00 – Payment Procedures.

1.04 FORMAT

A. Print schedule on AIA Documents G703 – Continuation Sheet for Application and Certificate for Payment.

B. Follow Table of Contents of Project Manual for listing components parts. Identify each line item by number and title of major Specifications Section.

1.05 CONTENT

A. Using CSI format, each school shall have a separate schedule of values for Renovation Work and for Addition Work, as applicable.

B. In CSI format, list installed value of each major item of Work and each subcontracted item of Work as a separate line item to serve as a basis for computing values for Progress Payments. Do NOT Round off values to nearest dollar. All values should be taken to the hundredth (penny).

C. In CSI format, for each major subcontract, list material and labor of that subcontract as separate line items.

D. List Owner Controlled Contingency Allowance and other allowances with the specified monetary amount for each allowance in separate divisions.

E. Contractor to use separate lines for bonds, insurance, temporary facilities and controls, superintendence, and mobilization. Each item shall include pro rata portion of overhead and profit.

F. The sum of the values listed shall equal total Contract Sum.

1.06 SUBMITTAL

A. Submit electronic copy of Schedule of Values within ten (10) days of award of contract and prior to Pre-Construction Meeting.

B. Transmit under Architect accepted form transmittal letter. Identify Project by title and number.

C. Secure the A/E and Program Manager's (PM) review of the Schedule of Values prior to submitting the first Pay Application.

D. Limit amount of items on the Schedule of Values not to exceed $25,000, unless approved by the Architect and the Program Manager.

E. Break all major equipment costs into equipment and materials/labor at a minimum.

1.07 SUBSTANTIATING DATA

A. When the A/E or the PM requires substantiating information, submit data justifying line item amounts in question.

B. Provide one (1) copy of data with cover letter for each copy of Pay Application. Show Pay Application number and date and line item by number and description.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION (Not Applicable)

END OF SECTION 01 29 73

SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General project coordination procedures.
2. Administrative and supervisory personnel.
3. Requests for Information (RFIs).
4. Project meetings.

B. Related Sections:
1. Division 01 Section "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
2. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. RFI: Request from Owner, Architect, or Contractor seeking information from each other during construction.

1.4 COORDINATION

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.

6. Pre-Installation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.
9. Shutdown requests
10. Abatement coordination
11. Owner inspections
12. Training

1.5 KEY PERSONNEL

A. Key Personnel Names: Within ten (10) days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and email addresses. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.6 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified using the District-specified electronic project management software.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. If solution(s) impacts the Contract Time, Construction Documents or the Contract Sum, Contractor shall state impact in the RFI. Select importance category from pull down menu.
12. Include e-mail notification to the Architect, Program Manager and District Project Manager for all RFI’s.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: Software-generated form generated using District-specified electronic project management software with substantially the same content as indicated above.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow fourteen (14) working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following RFIs will be returned without action:

    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for coordination information already indicated in the Contract Documents.
    d. Requests for adjustments in the Contract Time or the Contract Sum.
    e. Requests for interpretation of Architect's actions on submittals.
    f. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum will be administered per the general conditions of contract.

    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect and Program Manager in writing within seven (7) days of receipt of the RFI response.

E. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect and Program Manager within seven (7) days if Contractor disagrees with response.

F. RFI Log: Prepare, maintain, and submit on a weekly basis a log of RFI's organized by the RFI number. The log should be generated using the District-specified electronic project management software and should contain the following basic information:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were dropped and not submitted.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.
8. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.7 PROJECT MEETINGS

A. Preconstruction Conference: Architect will schedule and conduct a preconstruction conference at the earliest possible date after the execution of the Agreement and before starting construction, at a time convenient to Owner, PM and Architect.

1. Purpose of the conference will be to review responsibilities and personnel assignments.
2. Attendees: Authorized representatives of Owner, PM, Architect, and their consultants; Contractor, Contractor's Project Manager and its superintendents; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:
    a. Introductions
    b. Submission of Post Proposal Information if any outstanding

c. Tentative Construction schedule.
d. Safety
    1) Emergency Contact List
    2) First aid.
    3) Site Security.
    4) Badging requirements
e. Meetings: dates, locations, attendees, types, agendas
f. Communication: District-specified electronic project management software set up and administration procedures, correspondence flow
    1) Lines of communications, decision ladder and escalation procedures.
g. Schedule:
    1) Phasing
    2) Critical work sequencing and long-lead items
h. Designation of key personnel and their duties
i. Procedures for processing field decisions and Change Orders
j. Procedures for RFIs
k. Consultant / Lab Notification Requirements
    1) HazMat
    2) Roofing
    3) Test & Balance
    4) Materials Testing
    5) Inspecting
l. Procedures for processing Applications for Payment
    1) Schedule of Values
    2) Review
    3) M/WBE
m. Distribution of the Contract Documents.
n. Submittal procedures.
o. Preparation of record documents. Use of the premises and existing building Work restrictions.
p. Working hours.
q. After hours work requirements and overtime payment procedures.
r. Owner's occupancy requirements.
s. Responsibility for temporary facilities and controls.
    1) Site access
    2) Signage
    3) Dumpsters
    4) Fencing
    5) SWPPP
    6) Parking availability
    7) Office, work and storage areas
    8) Equipment deliveries and priorities
t. Procedures for shutdowns.
u. Progress cleaning.

4. Minutes: Architect will record and distribute meeting minutes and sign-in sheet using the District-specified electronic project management software.

B. Progress Meetings: The architect will schedule and administer progress meetings at weekly intervals.
1. Contractor shall make physical arrangements at site for the progress meetings.
2. Location of meetings: Contractor’s field office, unless agreed upon mutually by the Architect, Contractor and PM.
    a. Determine at the Pre-construction Meeting if space in the existing facility or facilities is available for meetings.
    b. For multiple school Bid Packages, weekly progress meetings will be held at each school site on a rotating basis. Site specific meetings may be held at the discretion of the PM.

3. Architect will prepare agenda, distribute notice of the meeting, preside at meetings, record minutes and distribute copies within three (3) days after meeting to participants, and to entities affected by decisions at meetings.
4. Coordinate dates of meetings with preparation of payment requests.
5. Attendees: In addition to representatives of Owner, Program Manager, Professional Consultants, as appropriate to the agenda, and Architect, each contractor, job superintendent, subcontractor, supplier, and other entities as appropriate to the agenda shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
6. Agenda:
    a. Review and correct or approve minutes of previous progress meeting.
    b. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
        1) Safety (lost time, accidents, violations, etc.)
        2) Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
            a) Review schedule for next period.
        3) New Business (Field observations, problems, decision, identification of problems which impeded planned progress, non-confirming work, etc.)
        4) RFI's and RFI log review
        5) Submittals and submittal log review
        6) RFP's, CAEAs and related log reviews
        7) Review of draft Application for Payment, as necessary.
    c. Review present and future needs of each entity present, including the following:
        1) Interface requirements.
        2) Sequence of operations.
        3) Access.
        4) Site utilization.
        5) Temporary facilities and controls.
        6) Progress cleaning.
        7) Quality and work standards.
        8) Status of correction of deficient items.
        9) Field observations.
        10) Pending claims and disputes.
7. Minutes: Using the District-specified electronic project management software, the entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
    a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction. These include pre-dig, pre-lift, pre-drill, pre-power shutdown, or pre-roof meetings at the work site prior to commencing the specific construction activity.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Owner, PM, and Architect of scheduled meeting dates, five business (5) days in advance
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

a. Contract Documents.
b. Related RFIs.
c. Approved submittals.
d. Review of mock-ups.
e. Possible conflicts and/or delays
f. Compatibility problems.
g. Time schedules.
h. Safety issues and AHA's
i. Weather limitations.
j. Manufacturer's written recommendations.
k. Warranty requirements.
l. Compatibility of materials.
m. Acceptability of substrates.
n. Space and access limitations.
o. Testing and inspecting requirements.
p. Installation procedures.
q. Coordination with other work.
r. Required performance results.
s. Protection of adjacent work.
t. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions, using the District specified electronic management software
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Pre-installation Conference: When required in individual Specification Sections, convene a Pre-installation conference at work site prior to commencing work of the section.
1. Require attendance of entities directly affecting or affected by Work of the Section.
2. Notify Owner, PM and Architect at least five (5) business days in advance of meeting date.
3. Prepare agenda, preside at conference, record minutes (using the District specified electronic management software), and distribute copies within two (2) business days after conference to participants.
4. Review conditions of reinstallation, preparation and installation procedures, and coordination with related work.

E. Project Closeout Conference: Schedule and conduct a Project closeout conference, at a time convenient to Owner, Program Manager and Architect, but no later than fourteen (14) days prior to the scheduled date of Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Authorized representatives of Owner, Program Manager, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:

a. Preparation of record documents.
b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
c. Submittal of written warranties.

d. Requirements for preparing operations and maintenance data.
e. Requirements for demonstration and training.
f. Preparation of Contractor's punch list.
g. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
h. Submittal procedures.
i. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes using the District-specified electronic project management software.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
   1. Daily construction reports.
   2. Material and equipment delivery status reports.
   .

B. Related Sections:
   1. Division 01 Section “Construction Progress Schedule”.
   2. Division 01 Section "Submittal Procedures" for submitting schedules and reports.
   3. Division 01 Section "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

   1. PDF electronic file uploaded to District’s Project Management software.

B. Daily Construction Reports: Submit at weekly intervals.

C. Material and Equipment Delivery Status Reports: Submit at weekly construction progress meetings.

PART 2 - PRODUCTS

2.1 REPORTS

A. Daily Construction Reports: Prepare a daily construction report using the District-specified Project Management software recording the following information concerning events at Project site:

   1. List of subcontractors at Project site.
   2. Approximate count of personnel at Project site.
   3. Equipment at Project site.
   4. Material deliveries.
   5. High and low temperatures and general weather conditions, including presence of rain or snow.

6. Accidents.
7. Meetings and significant decisions.
8. Unusual events (refer to special reports).
9. Stoppages, delays, shortages, and losses.
10. Meter readings and similar recordings.
11. Emergency procedures.
12. Orders and requests of authorities having jurisdiction.
13. Change Orders received and implemented.
14. Construction Change Directives received and implemented.
15. Services connected and disconnected.
16. Equipment or system tests and startups.
17. Partial completions and occupancies.
18. Substantial Completions authorized.

B. Material and Equipment Delivery Status Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.

PART 3 - EXECUTION – Not Used

END OF SECTION 01 32 00

SECTION 01 32 16 – CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 Description

A. Section includes administrative and procedural requirements for developing, submitting and updating a detailed Critical Path Method (CPM) project schedule and related reports. The project schedule is developed by the Contractor and herein referred to initially as the Preliminary CPM Schedule. Subsequent to the Owner, Architect and Contractor acceptance of the Preliminary CPM Schedule, the Contractor completes the development of a more complete and thorough schedule called the Detailed CPM Schedule. Once the Detailed CPM Schedule is accepted by the Program Manager (PM), Architect, and the Contractor, it shall be "baselined" and referred to as the Project Schedule or Detailed CPM Schedule. Monthly progress updates will be compared to the baseline schedule.

B. If the Contractor should desire or intend to complete the Work earlier than any required milestone, completion date, or end period of performance, then the Owner/PM shall not be liable to the Contractor for any costs or other damages should the Contractor be unable to complete the work before such milestone, completion date or end of Period of performance.

1.02 Quality Control and Quality Assurance

A. The Contractor shall develop and maintain a Project Schedule for each project site (School) (referred to as the Preliminary CPM Schedule and ultimately the Project Schedule) in accordance with the requirements of this Section. The requirement for a Project Schedule is included to:

1. Ensure adequate planning before and during the execution and progress of the Work in accordance with the allowable number of working days and milestones.
2. Assure coordination and execution of the work among various trades of the Contractor, subcontractors, suppliers, third party utility companies or other related entities that may be involved in the Project.
3. Assist the Contractor and the Owner in evaluating:
    a. Contract performance relative to the required contract schedule milestones
    b. Monthly progress
    c. Proposed Contract Modifications
    d. Documenting anticipated, requested and or approved time extensions
    e. The documentation of unplanned events, time extensions and other impacts arising from such events

B. The project schedule shall show the sequence and interdependence of activities required for complete performance of the work. The Contractor shall be responsible for assuring all work sequences are logical and show a coordinated plan of the work. The project schedule shall employ computerized CPM planning, scheduling and progress reporting of the work as described in this specification. The Contractor shall create and maintain the schedule using project scheduling software approved by the Owner and PM that utilizes the fundamentals of CPM for scheduling. The observance of the requirements herein is an essential part of the work under the Contract.

C. Within seven (7) calendar days after issuance of Notice to Proceed, the Contractor shall designate in writing a schedule representative in the Contractor's organization who shall be responsible for coordinating with the PM during development and maintenance of the Project Schedule. The Contractor's representative shall have the expertise to operate the CPM software and be capable of rapidly evaluating alternate scenarios to optimize management capabilities. The Contractor has the option to utilize qualified outside scheduling consultation for the assistance of developing and maintaining the Project Schedule, however, the use of an outside consultant does not relieve the Contractor of responsibilities for compliance of this specification. The Contractor's schedule representative shall have complete authority to act for the Contractor in fulfilling the schedule requirements of the Contract, and if such authority is interrupted during the Contract, approval shall be obtained in writing by the PM.

D. All activities shall have at least one predecessor and one successor unless approved by the PM. The exceptions are no predecessor is needed for the Notice To Proceed (NTP) milestone and no successor is needed for the Project Completion milestone.

E. **Contractor shall not use any constraints of any type without prior approval of the Owner.**

F. Each activity's "Activity ID" and "Activity Description" or "Task Name" shall remain unchanged throughout the duration of the project subsequent the baseline acceptance by the Owner.

G. An activity's "Activity Description" may only be revised to clarify an activity's original scope. If the scope of an activity increases or decreases, a replacement activity shall be created.

H. PM acceptance shall be obtained prior to making any changes or revisions to an activity's "Activity Description".

1.03 Submittals

A. All CPM Schedules shall be presented on two (2) copies (preferable 8 ½ x 11) and one electronic copy (accessible format, not pdf). Preliminary CPM Baseline Schedule: Within fourteen (14) calendar days after issuance of Notice to Proceed, but prior to the start of any construction activities, the Contractor shall submit the Preliminary CPM Baseline Schedule deliverable package. The preliminary baseline

schedule shall cover the planned activities for each project site (school) in sufficient level of detail.

B. Detailed CPM Schedule: Within thirty (30) calendar days after Notice to Proceed (NTP), the Contractor shall submit the Detailed CPM Baseline Schedule deliverable package, with a detailed schedule for each project site (school). The substantial completion date in the detailed CPM schedule shall coincide with the substantial completion date in the approved preliminary baseline schedule.

C. Schedule Update: The Contractor shall submit with the payment application a CPM Schedule Update on at least a monthly basis throughout the duration of the Work. The "baselined" Project Schedule, once updated for actual activities, shall be used as the first CPM Schedule Update. All schedule updates shall have a current data date (not older than 5 days). Include a narrative report specifying all changes and modifications made to the CPM schedule.

D. Recovery or Revision to the Detailed CPM Schedule: The Contractor shall provide a Recovery CPM Schedule within seven (7) calendar days of any CPM Schedule Update Meeting if any milestone, completion date or end of Period Performance falls seven (7) calendar days or greater behind (negative float).

E. Schedule Review: All schedules that are to be submitted for review shall be stamped as being reviewed/approved by the General Contractor and key subcontractors.

PART 2 PRELIMINARY CPM SCHEDULE

2.01 Preliminary CPM Schedule

A. The Preliminary CPM Schedule shall be the basis for the sequence of work during the first ninety (90) calendar days of the Contract while the Project Schedule is being developed, submitted, reviewed and accepted. The Preliminary CPM Schedule shall be updated on a monthly basis. If the acceptance of the Project CPM Schedule extends beyond one month, the Preliminary CPM Schedule shall be updated according to the requirements stated in paragraph 3.03.

B. The Preliminary CPM Schedule shall include:

1. The Procurement activities for each project site (school) to be accomplished (either in whole or in part) during the first ninety (90) calendar days of the Contract. The procurement activities shall include mobilization, shop drawing submittal, sample submittal, Architect/Engineer review and approval period, material fabrication and delivery of key and long-lead items. If portable swing space buildings are required for a project, the preliminary CPM schedule shall include milestones for relocation and installation of such swing space buildings.

2. The construction activities for each project site (school) to be accomplished (either in whole or in part) during the first ninety (90) days of the Contract. These activities shall be in units of

whole working days and shall be limited to a maximum of ten (10) work days, unless otherwise approved by the PM, except for non-construction activities including mobilization, procurement and concrete curing activities.

3. The approach to scheduling the remaining work or phases of work beyond the first ninety (90) calendar days of the contract. The work for each phase or milestone must be represented by at least one summary activity for each major item of work such that they cumulatively indicate the entire schedule, with milestones as defined in Paragraph 3.01, B.7. The approximate duration for each summary activity shall include the Contractor's best estimate for the work it represents.

4. Submit a written narrative describing the Contractor's approach to mobilization, procurement, and construction during the first ninety (90) calendar days of the Project. The narrative shall elaborate on the basis for durations, major equipment to be used, and shall identify all major assumptions used to develop and support the schedule. The narrative shall also include the Contractor's description of the critical path work activity as represented in the Preliminary CPM Schedule.

C. The Preliminary CPM Schedule shall be used for review of time extension request(s) until the Project CPM Schedule is accepted. When changes and alterations are initiated, unplanned events or excusable delays are experienced, or the Contractor desires to revise the sequence of work, the Contractor shall submit a written time impact analysis.

D. The final determination of all time extensions requested under the Preliminary CPM Schedule shall be determined and finalized subsequent to the review and acceptance of the Project CPM Schedule.

E. Deliverable: **No later than fourteen (14) calendar days after award of Contract, but prior to the start of any construction activities, the Contractor shall submit the Preliminary CPM Schedule deliverable package**. The deliverable package shall include at a minimum, the following information:

1. Two (2) copies (preferable 8 ½ x 11). The critical path shall be readily discernible in red ink.

2. Two (2) copies of the written narrative as described in paragraph 2.01B.5.

3. One (1) electronic copy (accessible format not pdf).

2.02 Schedule Review and Acceptance

A. The PM, Architect/Engineer and the Contractor shall meet within seven (7) calendar days of receipt of the Preliminary CPM Schedule for joint review. The Contractor shall revise any areas, which, in the opinion of the PM and/or Architect/Engineer, conflict with either the intent of this

specification or the timely completion and acceptable coordination of the Project. In the event the Contractor fails to define any element of work activity or logic currently designed and the PM review does not detect this omission or error, such omission or error, when discovered by the Contractor or the PM, shall be corrected by the Contractor and incorporated into the next schedule submission.

Within seven (5) business days after the joint review between the A/E, Contractor and the PM, the Contractor shall revise the Preliminary CPM Schedule in accordance with agreements reached during the joint review and submit the revised schedule per the deliverable requirements.

Acceptance of the Preliminary CPM Schedule by the A/E, Owner or PM does not relieve the Contractor of any of its responsibility for the accuracy or feasibility of the project schedule. However, to the extent that the accepted Project Schedule is reasonable, it becomes a part of this Contract.

B. Submission and final PM and Contractor acceptance of the Preliminary CPM Schedule will be a condition precedent to the application or payment of any progress payments under the Contract, unless otherwise agreed upon by the Owner. The PM shall notify the Contractor of the Owner acceptance of the Preliminary CPM Schedule in writing.

PART 3 PROJECT CPM SCHEDULE

3.01 Project Schedule

A. The Project Schedule shall begin at the project NTP and incorporate the accepted Preliminary CPM Schedule including all required revisions and applicable progress updating as warranted. The Project Schedule shall indicate a logical sequence of work for each project site (school) and major restrictions from the availability and use of manpower, material and equipment. Utilize the schedule in planning, scheduling, coordinating and performing the work under this Contract (including all activities of subcontractors, equipment vendors and suppliers). The Project Schedule shall indicate the sequence and interdependence of activities required for complete performance of the Work.

Proposed durations assigned to each activity shall be the Contractor's best estimate of time required to complete the activity considering the scope and resources planned for the activity. In developing the Project Schedule, the Contractor shall be responsible for ensuring that subcontractor work scope and sequencing at all tiers, as well as its own work, is included. If a contract for a subcontractor has not yet been awarded for a certain portion of the work, the Contractor is responsible for the development of the schedule for the work as described under this section. After the subcontractor award of contract, the Contractor shall modify the current accepted schedule to reflect any changes or revisions for the subcontractor sequence of work. Under no circumstance or event, shall a schedule modification or revision under

this paragraph extend a milestone. The Project Schedule shall comply with the various limits imposed by the scope of work and by any contractually specified intermediate milestone dates and completion dates. The degree of detail shall be to the satisfaction of the PM the A/E or the Owner.

B. Provide sufficient detail and clarity of form and technique so that all work can be properly controlled and progress monitored by the PM and A/E. The Project Schedule shall consist of, but not be limited to, the following criteria:

1. Full detail of all major procurement activities including the activities and information contained within the Preliminary CPM Schedule. Break up all procurement activities for major components and long lead items to include submittal dates, fabrication duration, and expected delivery dates.
2. Full detail of all major construction activities including the activities and information contained within the Preliminary CPM Schedule. Add column for responsible party for all construction activities.
3. Multiple Calendars shall be used for establishing Holidays and periods of non-work based on the School Operations Parameter Statement in the Project Information Section of Division 0, concrete curing activities, other weather or ambient temperature sensitive construction activities, and or other work requiring overtime or double shift work.
4. Seasonal weather conditions shall be considered and included in the planning and scheduling of all work influenced by high or low ambient temperatures, precipitation and/or saturated soil to ensure recognition, planning and anticipation of intermittent inclement weather throughout the project duration. In addition, activities of similar nature shall be assigned to independent calendars based on this weather data. The software calendars shall be updated monthly to reflect actual days worked.
5. Activity duration in whole working days with a maximum duration of ten (10) working days each, unless otherwise approved by the PM, except for non-construction activities including mobilization, procurement and concrete curing activities.
6. At a minimum, the following guidelines, intermediate and final milestones shall be included in the project schedules for each individual project site (school), except for activities that are specifically identified to be common for all the project sites for a multi-project bundle:

    a. Notice to Proceed

b. Required Periodic Inspections (examples: rebar, utilities, electrical and mechanical rough-in, overhead and architectural
c. Time allotted for coordination with and execution of abatement activities
d. Specific Phase start and finish dates – renovations and additions
e. Preliminary CPM Schedule submission and acceptance
f. Project Schedule submission and acceptance
g. Building dry-in
h. Permanent power
i. Conditioned air available
j. Completed testing and acceptance of Life Safety Systems and other critical building components
k. Completion of ADA upgrades in restrooms
l. Commissioning, when project requires
m. Ten percent (10%) minimum float for the project
n. Substantial Completion
o. Final Completion
p. Owner Turn-Over / Start-Up / Project Closeout Activity / Warranty Period / Owner Testing/Training
q. Earliest Date that Owner can occupy the affected portion of the building (by phase, by complete project, etc.). This shall include all necessary approvals, permits (Fire Marshall Acceptance, Certificate of Occupancy, etc.).

C. The Contractor shall prepare a written narrative explaining the Contractor's approach to construction for the entire Project and include the narrative information as submitted with the Preliminary CPM Schedule deliverable package. The narrative shall elaborate on the basis for durations, major equipment to be used, and shall identify all major assumptions used to develop and support the schedule. The narrative shall also include the Contractor's description of the critical path work activity as represented in the Project Schedule.

D. Deliverable: Within thirty (30) calendar days after the Notice to Proceed, the Detailed CPM Schedule deliverable submitted by the Contractor shall include at a minimum, the following information:

1. Two (2) copies (preferably 8 ½ x 11) of the project schedule. The critical path shall be readily discernible in red ink.
2. Two (2) copies of the written narrative as described in paragraph 3.01, B.5
3. One (1) electronic copy (accessible format not pdf)
3. A list of all rain days occurring over the past month. Each rain day shall be incorporated into the Project Schedule Calendar as record information subsequent to PM review and acceptance.

3.02 Schedule Review and Acceptance

A. Within fourteen (14) calendar days of receipt of the Contractor's proposed Project Schedule, the PM shall evaluate the schedule for compliance with this item and other Contract requirements, and notify the Contractor in writing of its findings.

B. If the PM does not request a revision or justification, The A/E, PM and the Contractor shall meet within seven (7) calendar days on a date selected by the PM and finalize acceptance of the schedule. If a revision or justification is requested by the PM and/or A/E, the Contractor shall re-submit the proposed Project Schedule within seven (7) calendar days and address all issues to the satisfaction of the PM. Any and all disagreements or interpretations of the meaning or intent of this specification shall be solely dictated by the Owner.

C. The PM, A/E and the Contractor shall meet within seven (7) calendar days of receipt of the Contractor's response for joint review, correction or adjustment of the Contractor's proposed Project Schedule. Any area, in the opinion of the PM and/or A/E, conflicts with timely completion of the project, shall be subject to revision by the Contractor. In the event the Contractor fails to define any element of work, activity or logic and the Owner review does not detect this omission or error, when discovered it shall be corrected by the Contractor and amended to the Project Schedule as soon as possible.

D. Within seven (7) calendar days after the joint review meeting, the Contractor shall incorporate revisions as directed by the PM and re-submit the proposed Project Schedule per the deliverable requirement as stated in paragraph 3.01, E. All further review by the PM shall be within seven (7) calendar days of receipt. The PM shall notify the Contractor in writing of final acceptance of the Contractor's Project Schedule.

E. The process of approving Contractor's schedules and updates to Contractor's schedule shall not constitute a warranty by the Owner that any non-Contractor milestones or activities will occur as set out on Contractor's schedule.

3.03 Schedule Updates

A. After the Project Schedule is accepted by the PM and the Contractor, it shall be "baselined" and used as a comparison for future progress updates. The accepted Project Schedule shall be updated on a monthly basis, or as directed by the Owner, throughout the duration of the work until final completion is met. The Contractor shall meet with the PM each month at a Project Progress Meeting to review the work progress update and PM comments regarding the Project Schedule update. The Contractor shall submit a schedule update no later than three (3) working days before the Project Progress Meeting for the PM to review and comment.

B. The percentage of all work shall be calculated by estimating the actual remaining duration of each progressed activity. The data date of each

schedule update shall be determined by the PM each month. Contractor prepared estimates of the percent completion of each scheduled activity and the necessary supporting data shall be submitted on or before the data date referenced above and shall include the following information:

1. One (1) original of the previous month's Schedule Update indicating actual activity start and/or finish dates to date, and revised (current) remaining durations.
2. A narrative report shall be included that indicates in writing those activities the Contractor plans to work on during the following update month and current or anticipated conditions that have delayed or may delay the work in order to discuss remedial action. The Contractor shall also explain, for work that reflects less than satisfactory progress, whether any uncompleted and/or upcoming work will (or will not) be affected in a like manner and the Contractors method of correction. Any additional written information necessary to support the updated schedule including explanations of revisions to activities: logic, durations, resources, etc.

C. In case of disagreements at the project progress meeting concerning actual progress to date, the Owner's determination shall govern. Upon completion of the schedule update meeting, the Contractor shall revise the Schedule Update to reflect progress as of the date of the schedule update meeting and any approved revisions to the Schedule Update and carry out a computer produced calculation to determine the status of the Project Schedule.

D. Each Schedule Update shall be forwarded to the PM within five (5) calendar days after the schedule update meeting and shall include two (2) copies of the narrative report with the following information:

1. Activities that have been added in the month of this Project Schedule Update.
2. Activities that have been deleted in the month of this Project Schedule Update.
3. Activities that have "Actual Starts" prior to the month of this Project Schedule Update and remain unfinished.
4. Activities that have "Actual Starts and Actual Finishes" in the month of this Project Schedule Update.
5. A description of any approved revisions to the activity descriptions, schedule logic, or initial activity durations.
6. One (1) print of the updated CPM Schedule Update indicating the progress made up to the date of the schedule update and indication of any revisions to the CPM Schedule Update.
7. Two (2) prints of the written narrative as described in paragraph 3.03, B.3.

8. A list of all rain days occurring over the past month. Each rain day shall be incorporated into the Project Schedule Calendar.

E. If the Contractor's monthly progress schedule update reflects, or PM determines, that the Contractor is at least ten percent (10%) or at least negative seven (-7) calendar days behind the “baselined” schedule, the Contractor shall provide a revised or recovery schedule. The Contractor’s revised or recovery schedule must incorporate a proposed plan for bringing the work back on schedule and completing the work by the contract completion date at no additional expense to the PM or Owner. The revised or recovery schedule shall be in accordance to paragraph 2.08.

3.04 Revisions to the Project Schedule

A. Revisions to the Schedule Update to reflect actual progress made up to the date of a schedule update shall not be considered as revisions to the Project Schedule. If as a result of the monthly schedule update, it appears the Project Schedule no longer represents the actual execution and progress of the work, PM will request, and the Contractor shall submit, a Revision to the schedule.

B. The Contractor may also request revisions to the Project Schedule in the event the Contractor’s planning for the work is revised. If the Contractor desires to make changes in the Project Schedule to reflect revisions in his method of operating and scheduling of the work, the Contractor shall notify PM in writing, stating the reason for the proposed revision. If revision to the schedule is contemplated, the Contractor or PM shall so advise the other in writing at least seven (7) calendar days prior to the next schedule update meeting, describing the revision and setting forth the reasons thereof.

Contractors must submit a three (3) week look-ahead schedule that will include all lifts, shutdowns, etc.

3.05 Project Float Time

A. Float time is not for the exclusive use or benefit of either the Contractor or the Owner. Contractor’s work shall proceed according to early start dates, and the Owner shall have the right to reserve and apportion float time according to the needs of the Project. The Contractor acknowledges and agrees that actual delays, affecting paths of activities containing float time, will not have any affect upon contract completion times, providing that the actual delay does not exceed the float time associated with those activities.

3.06 Impact Analysis for: Change Orders, Delays, and Contractor Requests

A. When changes are initiated, delays are experienced, or the Contractor desires to revise the Project Schedule, the Contractor shall submit to the PM written time impact analysis illustrating the influence of each change, delay or Contractor request, on any milestone. Each time impact analysis shall include a fragmentary network (network analysis) demonstrating how the Contractor proposed to incorporate the change,

delay or Contractor request into the schedule. The time impact analysis shall demonstrate the time impact to each and every affected activity in the Project Schedule utilizing the most recent schedule update as the basis for the analysis. The date of the most recent schedule update shall be a date prior to the date the change is given to the Contractor, the date the delay occurred or the date the Contractor submits a request for a change. The event times used in the time impact analysis shall include the most recent schedule update or as adjusted by mutual agreement. The time impact analysis shall include a backup copy on CD which shall contain the detail of the change, including but not limited to, added, changed or deleted data for activities and logic restraints. If the Detailed CPM Schedule is revised subsequent to submittal of a time impact analysis but prior to its approval, the Contractor shall promptly indicate in writing to the PM the need for any modification to its time impact analysis.

B. Activity delays shall not automatically mean that an extension of any milestones is warranted or due to the Contractor. A change or delay may not affect existing critical activities or cause non-critical activities to become critical. A change or delay may result in only absorbing a part of the available total float that may exist within an activity chain of the network, thereby not causing any effect on any milestone.

C. A comprehensive narrative of each time impact analysis shall be submitted within seven (7) calendar days after the commencement of a delay or the notice for a change is given to the Contractor.

D. Recommendation to the Owner for the acceptance or rejection of each time impact analysis by the PM and A/E shall be made within seven (7) calendar days after receipt unless subsequent meetings or negotiations are necessary. After a decision has been made by the Owner, a copy of the time impact analysis signed by the PM, A/E, Owner and the Contractor shall be returned to the Contractor and incorporated into the Project Schedule at the next monthly schedule update. The time impact analysis shall be incorporated into and attached to any relevant supplemental agreement (s).

END OF SECTION 01 32 16

SECTION 01 32 33 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Preconstruction photographs.
2. Periodic construction photographs.
3. Final completion construction photographs.
4. Preconstruction video recordings.
5. Periodic construction video recordings.

B. Related Sections:
1. Division 01 Section "Submittal Procedures" for submitting photographic documentation.
2. Division 01 Section "Closeout Procedures" for submitting photographic documentation as project record documents at Project closeout.
3. Division 01 Section "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 INFORMATIONAL SUBMITTALS

A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph or video recording. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.

B. Digital Photographs: Submit image files in the quantities and at the intervals described in paragraph 3.1 of this section.

1. Digital Camera: Minimum sensor resolution of at least 8 mega pixels.
2. Format: Unaltered original files, with same aspect ratio as the sensor, uncropped, date and time stamped, in folder named by date of photograph, accompanied by key plan file.
3. Identification: Provide the following information with each image description in file metadata tag:

a. Name of Project.
b. Name and contact information for photographer.
c. Name of Architect.
d. Name of Contractor.
e. Date photograph was taken.
f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
g. Unique sequential identifier keyed to accompanying key plan.

C. Construction Photographs: The project requires comprehensive documentation of construction progress and post inspection milestones. Submit prints of each photographic view in the quantities and at the intervals described in paragraph 3.1 of this Section.

1. Format: 8-by-10-inch (203-by-254-mm) on photographic paper to allow a 1-inch- (25-mm-) wide margin and enclosed back to back in clear plastic sleeves that are punched for standard three-ring binder.
2. Identification: On back of each print, provide an applied label or rubber-stamped impression with the following information:

    a. Name of Project.
    b. Name and contact information for photographer.
    c. Name of Architect.
    d. Name of Contractor.
    e. Date photograph was taken if not date stamped by camera.
    f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
    g. Unique sequential identifier keyed to accompanying key plan.

3. “Progression” photo sets are to be performed at pre-determined intervals throughout the duration of construction, as applicable to the scope and as follows:

    a. Site survey (Pre-construction): A onetime shot that provides coverage of site and immediate and immediate surroundings.
    b. Exterior progression shots: Taken from key perspectives along site perimeter and 360 degrees around building envelope, to be performed at monthly intervals.
    c. Interior progression shots: Broadly track the improvements from logical perspectives, to be performed at monthly intervals and coordinated with pace of erection.
    d. Pre-slab/Pre-Chase/Interior record shots: Underground or concealed utilities will be documented post inspection/pre-insulation and prior to pouring slabs, backfilling or closing chases/walls/ceilings.

D. Video Recordings: Submit video recordings in accordance with paragraph 3.2 of this Section.

1. Submit video recordings in digital video disc format.
2. Identification: With each submittal, provide the following information:

    a. Name of Project.
    b. Name and address of photographer.
    c. Name of Architect.
    d. Name of Contractor.
    e. Date video recording was recorded.
    f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
    g. Weather conditions at time of recording.

E. Aerial Photography
1. On new construction and addition projects, submit monthly aerial photographs of the project. The photos should be taken from 4 different angles and 4 sets of color 8”x10” prints should be submitted.

a. Digital Photographs: provide color images in JPG format with minimum sensor of 12 megapixels, and at an image resolution of not less than 3200 by 2400 pixels. Use flash in low light levels or backlit conditions.
b. Digital Video Recordings: Provide high resolution, digital video in MPEG format, produced by a digital camera with minimum sensor resolution of 12 megapixels and capable of recording in full high-definition mode. Provide supplemental lighting in low light levels or backlit conditions.

1.4 QUALITY ASSURANCE

A. Photographer Qualifications: An individual who has the basic skills necessary to record digital photographs and video recordings.

B. Drone Operator Qualifications: FAA Part 107 Licensed drone operator, certified as an unmanned aircraft operator with UAS rating for the operation of a commercial drone (unmanned aerial vehicle) pilot, having a minimum of 7 years' experience as a drone operator with current Certifications.

1.5 COORDINATION

A. Auxiliary Services: Provide auxiliary services necessary, including temporary lighting required to produce clear, well-lit photographs.

1.6 USAGE RIGHTS

A. Contractor will transfer copyright usage rights to Owner for unlimited reproduction of photographic documentation.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

A. Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of 8 mega pixels. Images shall not have their resolution reduced.

B. Digital Video Recordings: Provide high-resolution, digital video disc.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.

1. Maintain key plan with each set of construction photographs that identifies each photographic location.

2. Taking photographs or video recordings with students and schools staff included on the photograph is strictly prohibited.

B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

1. Date and Time: Include date and time in file name for each image.
2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Architect.

C. Preconstruction / Pre-Demo / Pre-Site Clearing Photographs: Before starting demolition or construction, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, or as directed by Architect.
1. Take photographs as required to show existing conditions adjacent to property before starting the Work.
2. Take photographs as required of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
3. Reference Section 017300 Execution for details of documenting and reporting existing conditions.

D. Periodic Construction Photographs: Take a photographs monthly and submit with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken. For renovation projects: The location and type of items to be photographed will be determined by the Architect and/or PM based on the specific project conditions not to exceed the number of progress photographs required above.

E. Final Completion Construction Photographs: Take color photographs after date of Substantial Completion for submission as project record documents. Architect will inform photographer of desired vantage points.

3.2 CONSTRUCTION VIDEO RECORDINGS

A. Preconstruction Video Recording: Before starting demolition or construction, record video of Project site and surrounding properties from different vantage points, as directed by Architect.
1. Show existing conditions adjacent to Project site before starting the Work.
2. Show existing buildings either on or adjoining Project site to accurately record physical conditions at the start of demolition or construction].
3. Show protection efforts by Contractor.
4. Narrate all noted conditions on the video.
5. On renovation projects with crawlspace work, record video of these areas before, during and after work is completed.

B. Periodic Construction Video Recordings: Record video monthly and submit with each Application for Payment. Select vantage points to show status of construction and progress since last video recordings were recorded. Minimum recording time shall be 15 minutes and shall include narration of actual conditions and progress made since last recording.

C. Owner’s Training: Record video during the manufacturer’s training session at substantial completion. Minimum recording time shall be 30 minutes per session. Deliver the recordings with the PDF Electronic File of the O&M Manual at Substantial Completion. Video shall be clear with easily understandable audio.

D. Submit videos in DVD format.

END OF SECTION 01 32 33

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Sections:
1. Division 01 Section "Payment Procedures" for submitting Applications for Payment.
2. Division 01 Section "Schedule of Values" for submitting the schedule of values.
3. Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
4. Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
5. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
6. Division 01 Section "Demonstration and Training" for submitting video recordings of equipment demonstration and training of Owner's personnel.

C. Refer to other Division 1 Sections and other Contract Documents for Specifications on administrative submittals. Such submittals include, but are not limited to the following:
1. Permits.
2. Payment Applications.
3. Inspection and Test Reports.
4. Schedule of Values
5. Progress Reports.
6. Listing of Subcontractors

D. Shop Drawings are technical drawings and data that have been specially prepared for this Project, including but not limited to the following items:
1. Fabrication and installation drawings.
2. Setting diagrams.
3. Shopwork manufacturing instructions.
4. Templates.
5. Patterns.
6. Coordination drawings (for use on-site).
7. Schedules.
8. Design mix formulas.
9. Contractor's engineering calculations.

Standard information prepared with specific reference to a Project is not considered to be shop drawings.

E. Product Data includes standard printed information on manufactured products that has not been specially prepared for this Project, including but not limited to the following items:

1. Manufacturer’s product specifications and installation instructions.
2. Standard color charts.
3. Catalog cuts.
4. Rough-in diagram and templates.
5. Standard wiring diagrams.
6. Printed performance curves.
7. Operational range diagrams.
8. Mill reports.
9. Standard product operating and maintenance manuals.
   Modify standard product data, drawings and diagrams to delete information not applicable to the project, and / or supplement standard information to provide specific data that is applicable to the work.

F. Samples are physical examples of Work, including but not limited to the following items:
1. Partial sections of manufactured or fabricated work.
2. Small cuts or container of materials.
3. Complete units of repetitively used materials.
4. Swatches showing color, texture and pattern.
5. Color range sets.
6. Units of work to be used for independent inspection and testing.

G. Miscellaneous Submittals are work-related, non-administrative submittals that do not fit in the three previous categories, including but not limited to the following:
1. Specially prepared and standard printed warranties.
2. Maintenance agreements.
3. Workmanship bonds.
4. Survey data and reports.
5. Project photographs.
6. Testing and certification reports.
7. Record Drawings.
8. Field measurement data.
9. Operating and maintenance manuals.
10. Keys and other security protection devices.
11. Maintenance tools and spare parts.
12. Overrun stock.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as action submittals.

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as informational submittals.

C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or modifications to submittals noted by the Architect and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal: Submit concurrently with start-up construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Monthly submittal log. Submit at the weekly progress meeting, an updated submittal log indicating status of all project submittals.
4. Final Submittal: Submit concurrently with the first complete submittal of Project schedule.

    a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

5. Format: Arrange the following information in a tabular format:

    a. Scheduled date for first submittal.
    b. Specification Section number and title.
    c. Submittal category: Action, informational.
    d. Name of subcontractor.
    e. Description of the Work covered.
    f. Scheduled date for Architect's final release or approval.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

B. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect’s receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 14 calendar days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 10 calendars days for review of each resubmittal.
4. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 14 calendar days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.

C. Identification and Information: Place a permanent label or title block on each paper copy submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Include the following information for processing and recording action taken:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Contractor.
    e. Name of subcontractor.
    f. Name of supplier.
    g. Name of manufacturer.
    h. Submittal number or other unique identifier, including revision identifier.
        1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
    i. Number and title of appropriate Specification Section.
    j. Drawing number and detail references, as appropriate.
    k. Location(s) where product is to be installed, as appropriate.
    l. Other necessary identification.

D. Identification and Information: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
    a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
4. Include the following information on an inserted cover sheet:

    a. Project name.
    b. Date.
    c. Name and address of Architect.
    d. Name of Contractor.
    e. Name of firm or entity that prepared submittal.
    f. Name of subcontractor.
    g. Name of supplier.
    h. Name of manufacturer.

i. Number and title of appropriate Specification Section.
j. Drawing number and detail references, as appropriate.
k. Location(s) where product is to be installed, as appropriate.
l. Related physical samples submitted directly.
m. Other necessary identification.

5. Include the following information as keywords in the electronic file metadata:

a. Project name.
b. Number and title of appropriate Specification Section.
c. Manufacturer name.
d. Product name.

E. Options: Identify options requiring selection by the Architect.

F. Deviations: Identify deviations from the Contract Documents on submittals and the transmittal sheet. Failure to note deviation may void action taken on submittal.

G. Transmittal: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review received from sources other than Contractor.

1. Transmittal Form: Provide locations on form for the following information:

a. Project name.
b. Date.
c. Destination (To:).
d. Source (From:).
e. Names of subcontractor, manufacturer, and supplier.
f. Category and type of submittal.
g. Submittal purpose and description.
h. Specification Section number and title.
i. Indication of full or partial submittal.
j. Drawing number and detail references, as appropriate.
k. Transmittal number, numbered consecutively.
l. Submittal and transmittal distribution record.
m. Remarks.
n. Signature of transmitter.

2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect’s action stamp.

I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

J. Use for Construction: Use only final submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Post electronic submittals as PDF electronic files directly to the appropriate location. Defined at the pre-construction meeting.

    a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2. Submit electronic submittals as PDF electronic files.

    a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
3. Action Submittals: Submit three paper copies of each submittal, unless otherwise indicated. Architect will return two copies.
4. Informational Submittals: Submit two paper copies of each submittal, unless otherwise indicated. Architect will not return copies.
5. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section "Closeout Procedures."
6. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
7. Test and Inspection Reports Submittals: Comply with requirements specified in Division 01 Section "Quality Requirements."

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable. Cross out all inapplicable data and information.
3. Include the following information, as applicable:
    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.
    e. Testing by recognized testing agency.
    f. Application of testing agency labels and seals.
    g. Notation of coordination requirements.
    h. Availability and delivery time information.
4. For equipment, include the following in addition to the above, as applicable:
    a. Wiring diagrams showing factory-installed wiring.
    b. Printed performance curves.
    c. Operational range diagrams.

d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:
   a. PDF electronic file.
   b. Three paper copies of Product Data, unless otherwise indicated. Architect will return two copies.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based upon Architect's digital data drawing files is otherwise permitted.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
   a. Identification of products.
   b. Schedules.
   c. Compliance with specified standards.
   d. Notation of coordination and accessibility (maintenance and service) requirements.
   e. Notation of dimensions established by field measurement.
   f. Relationship and attachment to adjoining construction clearly indicated.
   g. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 inches.

3. Submit Shop Drawings in the following format:
   a. PDF electronic file.
   b. Three opaque copies of each submittal. Architect will retain two copies; remainder will be returned.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:
   a. Generic description of Sample.
   b. Product name and name of manufacturer.
   c. Sample source.
   d. Number and title of applicable Specification Section.
3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
   a. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
   a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and

physically identical with material or product proposed for use, and that show full range of color and texture variations expected.

a. Number of Samples: Submit three sets of Samples. Architect will retain one Sample sets; remainder will be returned.
   1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
   2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product indicated in the Contract Documents.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.
5. Submit product schedule in the following format:

   a. PDF electronic file.
   b. Three paper copies of product schedule or list, unless otherwise indicated. Architect will return two copies.

F. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."

G. Application for Payment: Comply with requirements specified in Division 01 Section "Payment Procedures."

H. Schedule of Values: Comply with requirements specified in Division 01 Section "Schedule of Values."

I. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.
4. Submit subcontract list in the following format:

   a. PDF electronic file.

J. Coordination Drawings: Comply with requirements specified in Division 01 Section "Project Management and Coordination."

K. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

L. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on American Welding Society (AWS) forms. Include names of firms and personnel certified.

M. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

N. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

O. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

P. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

Q. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

R. Product Test Reports: Submit written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

S. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

T. Schedule of Tests and Inspections: Comply with requirements specified in Division 01 Section "Quality Requirements."

U. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

V. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

W. Field Test Reports: Submit reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

X. Maintenance Data: Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."

Y. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect, no later than 30 days after notice to proceed.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Project Closeout and Maintenance/Material Submittals: Refer to requirements in Division 01 Section "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT/ENGINEER’S ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
   1. Action Stamp: The Architect/Engineer will stamp each submittal to be returned with a uniform, self explanatory stamp, appropriately marked and executed to indicate whether the submittal returned is for unrestricted use, final-but-restricted use (as marked), must be revised and resubmitted (use not permitted) or without action (as explained on the transmittal form).

C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

E. Incomplete submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

F. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 01 33 00

MEMORANDUM

To: All General Contractors working on Elementary Schools (and other facilities occupied by children under the age of 6) built before 1978 for Dallas ISD Construction Services Department
From: DISD Executive Director
Construction Services
Date: June 14, 2010

RE: EPA Lead-Based Paint Renovation, Repair, and Painting Program

In April of 2008, the EPA introduced its new Lead-Based Paint Renovation, Repair, and Painting Program Rule, hereafter referred to as the RRP. This new rule requires renovation firms to be EPA-certified. Furthermore, the rule requires workers to be trained to use lead-safe work practices when they disturb painted surfaces in buildings built prior to 1978 and which are occupied by children under age 6. These requirements became fully effective on April 22, 2010.

In addition, pre-renovation education requirements are in effect. These require contractors and others who perform renovations for compensation and that may disturb lead-base paint in child occupied facilities built before 1978 to distribute a lead pamphlet to the users of the facility. The RRP defines renovation broadly to include any activity that disturbs painted surfaces greater than 6 square feet per room on the interior and greater than 20 square feet on the exterior of a facility.

It is the understanding and expectation of Dallas ISD that renovation contractors should be fully aware of and in compliance with this new EPA rule.

IF YOUR FIRM IS CURRENTLY PERFORMING RENOVATION WORK ON A CAPITAL IMPROVEMENT PROGRAM PROJECT, AND YOUR FIRM IS NOT IN FULL COMPLIANCE WITH THE NEW RULE, YOU MUST CEASE ACTIVITIES IMMEDIATELY ON ANY WORK THAT MAY DISTURB MORE THAN 6 SF (20 SF ON EXTERIOR) OF PAINTED SURFACES, OR WINDOW REPLACEMENT IN BUILDINGS BUILT PRIOR TO 1978 AND WHICH ARE OCCUPIED BY CHILDREN UNDER AGE 6.

If you must cease work on any portion of the project as a result of this rule, please contact your Project Manager immediately to discuss the appropriate course of action.

If you are in full compliance with the rule, as should be the case, please submit the following at your earliest convenience:

- EPA firm certification (In the absence of prime's firm certification, the certification from the appropriate sub-contractor and the prime's application for certification will suffice for now)
- Identify who is the certified staff on site
- Evidence of worker training by the certified staff
- Summary of lead-safe work practices to be implemented

In addition, please prepare to attend a meeting with the School Principal, Dallas ISD PM and PM to inform her/him about the rule, share the RRP pamphlet and Notices. Your PM will notify you of date and time of the meeting.

If the scope of work planned or in progress does not require compliance with the training and lead-safe work practices of the RRP, then you may continue on with the construction activities and there is no need for any further action on your part. At the same time, the Owner understands that contractors are responsible for compliance with the rule. Therefore, the Owner's expectation is that you will bring to the PM's attention immediately, any scope of work that may trigger compliance with this rule.

Cc: Dallas ISD PM
Program Director, PM Firm
Construction Manager, PM Firm
Project Manager, PM Firm
PM Firm Document Control

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. Owner will employ and pay for the service of an Independent Testing Laboratory to perform specified testing and laboratory services.
   1. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
   2. Contractor shall cooperate with the Laboratory to facilitate the execution of its required services.
   3. Contractor shall pay for additional samples and tests required for Contractor's convenience or when initial tests indicate work does not comply with Contract Documents.
   4. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
   5. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
   6. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, Commissioning Authority, Construction Manager, or authorities having jurisdiction are not limited by provisions of this Section.

C. Related Sections:

   1. Division 01 Section "Allowances" for testing and inspecting allowances.
   2. Division 01 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
   3. Division 01 Section "Execution" for cutting and patching.
   4. Divisions 02 through 49 Sections for specific test and inspection requirements.
   5. Division 01 Section "Testing, Adjusting, and Balancing for HVAC" **(FOR INFORMATION ONLY – TAB SERVICES PROVIDED BY OWNER)**

1.3 DEFINITIONS

A. Quality Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect or Construction Manager.

C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Laboratory Mockups: Full-size physical assemblies constructed at testing facility to verify performance characteristics.
2. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies.
3. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged by the Owner to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade or trades.

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with

the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

C. Conflicts between the specifications and the construction documents. The most stringent requirement will govern.

D. Conflicts on specification requirements. The most stringent requirement will govern.

1.5 ACTION SUBMITTALS

A. Shop Drawings: For [integrated exterior] [laboratory] mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.
   1. Indicate manufacturer and model number of individual components
   2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 INFORMATIONAL SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Qualification Data: For Contractor's quality-control personnel.

C. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

D. Schedule of Tests and Inspections: Prepare in tabular form and include the following, as applicable:

   1. Specification Section number and title.
   2. Entity responsible for performing tests and inspections.
   3. Description of test and inspection.
   4. Identification of applicable standards.
   5. Identification of test and inspection methods.
   6. Number of tests and inspections required.
   7. Time schedule or time span for tests and inspections.
   8. Requirements for obtaining samples.
   9. Unique characteristics of each quality-control service.

1.7 CONTRACTOR’S QUALITY CONTROL PLAN

A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice of Award, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.

B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
   1. Project quality-control manager [may also serve as Project superintendent] [shall not have other Project responsibilities].

C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
   1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
   2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
   3. Owner-performed tests and inspections indicated in the Contract Documents [, including tests and inspections indicated to be performed by the Commissioning Authority].

E. E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.

F. F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.8 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following as applicable:

   1. Date of issue.
   2. Project title and number.
   3. Name, address, and telephone number of testing agency.
   4. Dates and locations of samples and tests or inspections.
   5. Names of individuals making tests and inspections.
   6. Description of the Work and test and inspection method.
   7. Identification of product and Specification Section.
   8. Complete test or inspection data.
   9. Test and inspection results and an interpretation of test results.
   10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
   11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
   12. Name and signature of laboratory inspector.
   13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.9 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
   1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329, 'Standards of Recommended Practices for Inspection and Testing Agencies for Concrete and Steel as Used in Construction'; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.

   1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
   2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
   1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect [or Construction Manager].
   2. Notify Architect [and Construction Manager] seven days in advance of dates and times when mockups will be constructed.
   3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
   4. Demonstrate the proposed range of aesthetic effects and workmanship.
   5. Obtain Architect's [and Construction Manager's] approval of mockups before starting work, fabrication, or construction.
      a. Allow seven days for initial review and each re-review of each mockup.
   6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
   7. Demolish and remove mockups when directed unless otherwise indicated.

K. Integrated Exterior Mockups: Construct integrated exterior mockup [according to approved Shop Drawings] [as indicated on Drawings]. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials.

L. Room Mockups: Construct room mockups incorporating required materials and assemblies, finished according to requirements. Provide required lighting and additional lighting where required to enable Architect to evaluate quality of the Work. Provide room mockups of the following rooms:
   1. List or rooms requiring mockups.

1.10 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor**,** and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. GC/Contractor will have a quality control program in place to review the installation and serviceability of all field devices and valves.
3. For tests and inspections performed by the Owner’s Testing Laboratories:
    a. Cooperate with Laboratory personnel; provide access to Work and to manufacturer’s operations.
    b. Secure and deliver to the Laboratory adequate quantities of representational samples of materials proposed to be used and which require testing.
    c. Furnish to the Laboratory proposed concrete design mixes, and other material mixes which require evaluation by the Testing Laboratory, a minimum of fourteen (14) days prior to use on the Project.
    d. Furnish incidental labor and facilities
        1) To provide access to Work to be tested.
        2) To obtain and handle samples at the Project site or at the source product to be tested.
        3) To facilitate inspections and tests.
        4) For safe storage and curing of test samples.
        5) Notify Laboratory, PM and Architect sufficiently in advance of operations to allow for Laboratory assignment of personnel and scheduling of tests.
            a) When test or inspections cannot be performed after such notice, reimburse Laboratory for personnel and travel expenses incurred due to Contractor’s negligence.
        6) Make arrangements with Laboratory and pay for additional samples, tests, or inspections as required for the Contractor’s convenience.
        7) Make arrangements with Laboratory and pay for additional samples and tests required when initial test indicate non-compliance with Contract Documents, including load test.

4. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
    a. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
    b. Retain first subparagraph below if some Specification Sections require an independent testing agency to perform certain tests and inspections.
    c. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
    d. Retain first subparagraph below to assure validity of agencies' reports.

e. Notify testing agencies at least twenty-four (24) hours in advance of time when Work that requires testing or inspecting will be performed.
f. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.

5. Testing and inspecting requested by Contractor and not required by the Contract Documents is Contractor's responsibility.

6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."

D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

F. Testing Agency Responsibilities: Cooperate with Architect, Commissioning Authority, Construction Manager, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect, Commissioning Authority, Construction Manager, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses. .

1. Distribution: Distribute schedule to Owner, PM, Architect, Commissioning Authority, Construction Manager, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect's, Commissioning Authority’s, Construction Manager’s reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 01 Section "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

SECTION 01 42 00 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 DESCRIPTION OF WORK REQUIREMENTS

A. General: This Section specifies procedural and administrative requirements for compliance with governing regulations and codes and standards imposed upon the Work. These requirements include the obtaining of permits, licenses, inspections, releases, and similar statements, as well as payments, associated with regulations, codes, and standards.

B. “Regulations” is defined to include laws, statutes, ordinances, and lawful orders issued by governing authorities, as well as those rules, conventions and agreements within the construction industry which effectively control the performance of the Work regardless of whether they are lawfully imposed by governing authority or not.

C. Governing Regulations: Refer to General and Supplementary Conditions for requirements related to compliance with governing regulations.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference. Individual Specification Sections indicate which codes and standards the Contractor must keep available at the project site for reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Conflicting Requirements: Where compliance with two or more standards is specified, and where these standards establish different or conflicting requirements for minimum quantities or quality levels, the most stringent requirement will be enforced, unless the Contract Documents specifically indicate a less stringent requirement. Refer requirements that are different, but apparently equal, and uncertainties as to which quality level is more stringent to the Architect/Engineer for a decision before proceeding.

D. Minimum Quantities or Quality Levels: In every instance the quantity or quality level shown or specified is intended to be the minimum for the work to be provided or performed. Unless otherwise indicated, the actual work may either comply exactly, within specified tolerances, with the minimum quantity or quality specified, or may exceed that minimum within reasonable limits. In complying with these requirements, the indicated numeric values are either minimum or maximum values, as noted, or as appropriate for context of the requirements. Refer instances of uncertainty to the Architect/Engineer for decision before proceeding.

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the trade association, standards-producing organization, authorities having jurisdiction or other entity applicable to the context of the text provision.

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the.

C. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations

1.06 SUBMITTALS

A. Permits, Licenses and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence, and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00

SECTION 01 45 23 - HVAC TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Owner will employ and pay for the service of an Independent Testing Agency for Testing, Adjusting and Balancing (TAB) of HVAC systems.

1. The Testing, Adjusting and Balancing of air conditioning systems will be performed by an impartial Independent Technical Firm whose operations are primarily engaged in the field of professional TAB. TAB work shall be done under direct supervision of a professional engineer, licensed in the State of Texas, a Test and Balance Engineer (TBE, AABC) or TAB Certified Professional (TAB CP, NEBB), or other experienced/certified TAB professional deemed appropriate by the Owner. All personnel performing TAB work shall be fulltime, regular employees of the TAB firm.

2. The Contractor shall cooperate with the Owner provided TAB firm; provide necessary data on design and proper application of system components; furnish labor and materials required to eliminate any deficiencies or mal-performance.

1.2 RELATED WORK

A. Drawings and General Provisions of the Contract, including General, Supplementary and Other Conditions and Division – 1 Specifications Sections, apply to work of this Section.

B. Refer to Division 23 and Division 26 for testing in conjunction with Mechanical and Electrical work.

1.3 QUALIFICATION OF HVAC TESTING, ADJUSTING AND BALANCING FIRM

A. Minimum Qualification of HVAC Testing, Adjusting and Balancing Firm:

1. General:

a. Each professional firm desiring to submit proposals for testing and balancing HVAC systems for Project shall submit necessary brochures describing history of firm and qualifications of personnel to Architect.

b. Each professional firm shall have a minimum of five years of experience.

c. Each submittal shall contain a listing of similar projects.

d. Each professional firm submitting such information on its qualifications and personnel shall keep information current by submitting supplemental data a minimum of once every six (6) months or when professional or technical personnel who shall perform the work may change.

e. Each professional firm warrants by submittal of its personnel qualifications that such personnel shall be used in the performance of the work. In the event of personnel change, professional firm submitting proposal shall submit complete qualifications and experience of new personnel. Owner, upon acceptance of proposal, expects work to be performed by the personnel whose experience is so described.

2. Qualifications of Firm:

a. Firm shall be one which is licensed to perform professional services of this specified type and as a minimum have one professional engineer (PE), TBE or TAB CP (or equivalent) with current registration/certification to perform such professional services.

b. Firm shall be capable of performing services at location of facility described within time specified, preparing and submitting the detailed report of actual field work as may be required.

c. Firm shall be a member in good standing of Associated Air Balance Council (AABC), National Environmental Balancing Bureau (NEBB), or other experienced/certified TAB governing body deemed appropriate by the Owner, and listed in its current relevant directory.

1.4 TAB FIRM DUTIES AND RESPONSIBILITIES

A. HVAC Testing and Balancing:

1. TAB firm shall act as liaison between Owner, Architect, and Contractor and inspect installation of mechanical piping systems, sheet metal work, temperature controls, and other component parts of Heating, Air- Conditioning and Ventilating systems. Inspection of work shall cover that part relating to proper arrangement and adequate provisions for Testing and Balancing.

2. TAB firm, within sixty (60) days of its employment, shall review Drawings and Specifications to identify potential Testing/Balancing problems and to determine if there are adequate provisions for Testing and Balancing systems. Report any problem to Architect or Architect's representative and Program/Project Manager.

3. Upon completion of installation, start-up, and Controls Contractor point to point verification review on mechanical equipment, check, adjust and balance system components to obtain design conditions in each conditioned space in building. Prepare and submit to Owner, or Owner's delegated representative, complete reports on the Test/Balance and operation of systems.

4. Permanent employed technicians or engineers of firm must do measurements and recorded readings of air, water and electricity that appear in reports.

5. Make a total of three (3) inspections within ninety (90) days after occupancy of building to insure that satisfactory conditions are being maintained throughout and to satisfy any unusual conditions.

6. Make an inspection in building during opposite season in which initial adjustments were made, and at that time make any necessary modifications to initial adjustment required to produce optimum operation of system components to produce proper conditions in each conditioned space. At time of opposite season checkout, Owner's representative shall be timely notified before any readings or adjustments.

1.5 CONTRACTOR'S RESPONSIBILITIES

A. HVAC Testing, Adjusting and Balancing

1. Contractor shall add TAB activities to the Project schedule to allow TAB completion prior to the scheduled Substantial Completion date. TAB completion requires fully functioning HVAC, Lighting and Domestic Hot Water Systems, including all necessary controls. The Owner may occupy the completed areas of the site and

existing building prior to Substantial Completion. Cooperate with the Owner during TAB operations to minimize conflicts with Owner's operations

2. Have all systems complete in operational readiness prior to notifying TAB firm that Project is ready for their services. Include scheduled testing dates and times requested allowing a minimum of 7 days prior notification and so certify in writing to Owner that such a condition exists.

3. Make any changes in sheaves, belts and dampers or the addition of dampers required for correct balance as required by TAB firm, at no additional cost to the Owner or TAB Firm.

3. Provide and coordinate services of qualified, responsible subcontractors, suppliers and personnel as required to correct, repair or replace any and all deficient items or conditions found during the Testing, Adjusting and Balancing period.

4. In order that systems may be properly Tested, Adjusted and Balanced as required by these specifications and industry standards, operate said systems for length of time necessary to properly verify that the equipment is free from defects and meets the operational requirements outlined in this Specification and the construction documents. Indicate the completion and readiness for TAB and pay costs of operations during TAB period. Contractor's failure to complete the TAB work by the scheduled date of Substantial Completion will not be a reason to extend the Substantial Completion date, the Final Completion date, or for the Contractor to receive additional monies.

5. The costs for the TAB Firm to re-evaluate functionality of systems due to open issues shall be bore by the Contractor.

6. The TAB Firm will be available for two attempts of Testing, Adjusting and Balancing the Systems with minimal follow-up where necessary (due to deficiencies, systems not ready, incomplete work, etc.) in an effort to accomplish the TAB requirements. When additional work or project site visits are required because Systems are not ready or because they do not successfully meet industry standard installation and functionality requirements, the Contractor will be charged for the TAB Firm's additional reasonable re-testing costs. Charges include a flat fee of $300 plus an hourly fee at the TAB Firm's standard rates per employee that mobilized to the project site for each visit. Additional fees will be paid to the TAB Firm by the Owner and shall be reimbursed to the Owner by the Contractor.

7. Complete operational readiness, prior to commencement to TAB services shall include the following:
    a. Construction status of building permits closing of doors, windows and ceilings installed to obtain projected operational conditions.
    b. All Volume damper handles shall be clearly identified with red/orange/yellow vinyl tape to identify locations.
    c. A clean/new set of Final Filters shall be installed prior to the commencement of TAB services.

8. Air Distribution Systems:
    a. Verify installation for conformity to design. Supply, return and exhaust ducts terminated and pressure tested for leakage as required by Specifications.

b. Volume and fire dampers properly located and functional. All dampers shall be left in the fully open position. Dampers serving requirements of minimum and maximum outside air, return and relief, shall provide tight closure and smooth operation.

c. Supply, return, exhaust and transfer grills, registers, diffusers and terminal units installed, connected and fully functional.

d. Air handling systems, units and associated apparatus, such as filter sections and access doors, shall be blanked or sealed to eliminate excessive bypass or air leakage.

e. Fans (supply, return, and exhaust) operating and verified for freedom from vibration, proper fan rotation and belt tension; heater elements shall be proper size and rating; all VFDs shall be fully functional and programmed; record motor amperage and voltage and verify name plate ratings are not exceeded.

9. Water Circulating Systems:
   a. Check and verify pump alignment and rotation.

   b. Position and valves pertinent to system design and require operation to permit full flow of water through system components. Operate hydronic systems under full flow conditions until circulating water is clean. Strainers shall be removed and cleaned as required during this cycle of operation.

   c. Record each pump motor amperage and voltage. Readings shall not exceed nameplate rating.

   d. Verify electrical heater elements to be of proper size and rating or VFD programming complete.

   e. Water circulating systems shall be full of water and free of air, expansion tanks set for proper water level and air vents installed at high points of systems and operating freely. Verify that the Make-up water pressure is set properly. All manual flow control valves shall be left in the fully open position.

   f. Check and set operating temperature of heat exchangers to design requirements.

   g. Submit digital copies of the recorded findings on the above mentioned items to the TAB firm.

10. Automatic Controls:
    a. Verify that control components are installed in accordance with Project requirements and functional, including electrical interlocks, damper sequences, freeze-stats and smoke detectors.

    b. Controlling instruments shall be functional and set for designed operating conditions. Factory pre-calibration of thermostats will not be acceptable.

11. TAB firm will not instruct/direct Contractor in any of the work, but will make such reports as are necessary direct to Owner.

12. For design document required plans and miscellaneous adjustment devices for purpose of adjustment to obtain design conditions; install these devices in a manner that will leave them readily accessible, provide access as required by TAB firm.

13. Provide Plans, Plan Revisions, Architectural Specifications, and Change Orders to TAB firm at least 21 days prior to commencement of TAB work.

14. Provide approved Submittal data on equipment installed and related changes required to accomplish test procedures outlined in this Section of the Specification to the TAB firm at least 21 days prior to commencement of TAB work.

15. Transmit one (1) copy of the following 'Record for Owner' to TAB firm for review and comments at least 21 days before commencement of TAB work:
    a. 'As installed' drawings.
    b. Approved Fixture Brochure.
    c. Approved Wiring Diagrams.
    d. Approved Control Diagrams.
    e. Approved, Implemented and Verified Sequences of Operations
    f. Shop Drawings.
    g. Approved Submittals.

1.6 HVAC TESTING, ADJUSTING AND BALANCING

A. Testing and Balancing Air Systems:
    1. Test and adjust air systems to conditions set forth in Plans and Specifications. Air systems include:
        a. Supply Air Systems.
        b. Return Air Systems.
        c. Exhaust Air Systems.
    2. In fan systems, air quantities indicated on Plans may be varied as required to secure a maximum temperature variation of two (2) degrees within each controlled space, but total air quantity indicated for each zone must be obtained.
    3. Test and Adjust blowers and fan to deliver CFM required by systems with concurrent recording of RPM, supply voltage and full load amperes. Report any changes of belts and sheaves required.
    4. Make Pitot tube traverses of main supply, return and exhaust ducts and adjust fans and dampers to achieve specified air volumes. Patch and cover the Pitot tube holes after air balancing is complete. For Equipment exposed to the sun, metal grommets shall be used.

5. Test and Adjust fresh air intake and return air dampers and louvers to conditions scheduled or required.

6. Test and record static pressure on entering and leaving side of each supply fan, exhaust fan filter, coil and balancing dampers and other components of the system.

7. Test and adjust supply air diffusers, grilles, and return air registers to Specification requirements and as shown on Drawings. Adjust supply diffuser pattern blades for proper air distribution in each room or space.

8. A test and balance report shall be completed and submitted to the Owner that includes air flow, temperature and pressure test results for all HVAC equipment/systems included in the project. The systems shall include unit testing that verifies control system correct operation.

B. Testing and Adjusting of Water System:
   1. Flow of water through water coils shall be adjusted by adjusting valves until rated pressure drop across each coil is obtained and water flow verified by Venturi readings. On those with three-way valves, rated pressure drop shall first be adjusted though coils in each of several systems and the temperature differential between inlet and outlet shall be determined to be in accordance with its rating. Bypass valves shall then be adjusted on each coil until an equal pressure drop between supply and return connections is obtained with three-way valves set to bypass all coils in each of the several systems.

   2. Geothermal Heat Pumps TAB shall be performed with a single unit per well field operating. This single unit balancing shall include both the air side, particularly the outside air, and the water side.

C. Testing and Adjusting of Automatic Controls:
   1. Test automatic controls, controlled devices, interlocks, safety devices associated with HVAC system for proper operation and sequence during heating, cooling, intermediate and smoke removal modes of operation. Adjust automatic controls to deliver required quantities of air at temperatures specified or scheduled on Plans and to maintain proper conditions in each room of the building.

   2. Report deficiencies or malfunctions to Owner in the form of a formal, written Deficiency Report.

D. Equipment Settings:
   1. Before final acceptance of reports is made, TAB firm shall furnish Owner the following data:

      a. Summary of main supply, return and exhaust duct Pitot tube traverses and fan settings indicating minimum value required to achieve specified air volumes.

      b. A tabulated record of temperature in all spaces on each separately controlled zone, together with outside temperature at time of measurement.

      c. A list of measured air quantities at each outlet corresponding to temperature tabulation specified above.

      d. Air quantities at each return and exhaust air-handling devices.

e. Supply pressure readings entering and leaving each supply fan, exhaust fan, filter, balancing dampers and other components of ventilation equipment and systems. These readings shall be quantified using fan curves in terms of CFM handled.

f. Motor current readings per phase at each equipment motor. Voltage at time of reading shall be listed.

g. Water pressure reading at gauge connections. Pressure readings at coils and pumps shall be quantified using coil and pump curves in terms of GPM flow through metering stations at each coil if applicable.

h. Water temperature readings entering and leaving each coil and heat exchanger under maximum load conditions in each case.

i. Unless specified otherwise in Specification 23 05 93, set HVAC system airflow and water flow rates within the following tolerances:

A. Supply, Return, Exhaust Fans and Equipment with Fans:

1. +/- 10 % of Design conditions.

B. Air Devices

1. +/-10 % of Design conditions.

C. Hydronic Flow Rates

1. +/- 10 % of Design conditions.

2. The final report shall certify test methods and instrumentation used, final velocity reading obtained, air quantities at each outlet supply, return, exhaust, temperature, pressure drops, RPM of equipment, amperage of motors, air balancing problems encountered, recommendations and uncompleted punch list items.

3. A summary of actual operating conditions shall be included on each system outlining normal and/or ventilation cycles of operation. The intent of final report will provide a reference of actual operating conditions for Owner's operating personnel

.

4. Certificate of Substantial Completion will not be signed by the Owner unless an acceptable TAB deficiency report has been provided and accepted by the Owner. An acceptable deficiency report shall indicate that the TAB work is completed except for deficiencies that can be resolved within 14 days.

5. Ensure that all systems are balanced at the proper time in the opposite season.

PART 2 – PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 45 23

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Sections:
1. Division 01 Section "Summary" for work restrictions and limitations on utility interruptions.
2. Division 32 Section "Concrete Paving" for construction and maintenance of cement concrete pavement for temporary roads and paved areas.

1.3 DESCRIPTION OF REQUIREMENTS.

A. Connections for temporary and permanent utilities and payment for temporary utilities services required for the Work, whether the Work is new construction or renovation of an existing facility, are the responsibility of the Contractor. Cost or use charges for temporary services or facilities will not be accepted as a basis of claims for a Change Order. Temporary utilities services required for use at the project site include but are not limited to the following:
1. Water service and sewer.
2. Temporary electric power and light.
3. Telephone service and internet.
4. Provide adequate utility capacity at each stage of construction.
5. Prior to availability of temporary utilities at the site, provide trucked-in-services for start-up of construction operations.

B. Temporary construction and support facilities required for the Project include but are not limited to the following:
1. Temporary heat.
2. Field offices and storage sheds.
3. Sanitary facilities, including drinking water.
4. Dewatering facilities and drains.
5. Temporary enclosures.
6. First aid station.
7. Project identification, bulletin boards and signs.
8. Waste disposal services.
9. Rodent and pest control.
10. Construction aids and miscellaneous general services and facilities.
11. Alternate temporary services and facilities, equivalent to those specified, may be used, subject to acceptance by the Architect/Engineer and Program Manager.
12. Temporary Interior Barriers
13. Temporary Exterior Barriers

C. Security and protection facilities and services required for Project include but are not limited to the following:
   1. Temporary protected interior walkway between occupied building areas.
   2. Dust barricade between occupied building areas and work areas.
   3. Temporary fire protection.
   4. Barricades, warning signs, lights.
   5. Sidewalk bridge or enclosure fence for the site.
   6. Environmental protection.
   7. Alternate security and protection methods or facilities, equivalent to those specified, may be used, subject to acceptance by the Architect/Engineer.
   8. The Contractor shall provide a temporary barrier whenever a certain area of the school is sealed off for remodeling work for phasing purposes. The barrier shall be made of 3/4" plywood or drywall, and it shall extend from floor to ceiling, wall to wall. The temporary barrier shall have a door that can be locked. This barrier will remain until work in the specified area is completely finished. The barrier may subsequently be moved to a different location, provided that it still meets the requirements. Proper signage should be displayed near the temporary barrier, according to safety regulations. Any temporary barriers will need to be coordinated with the emergency egress plan of the building. Signage is to be paid for by an Owner's allowance of $7,500.00. Bond Marketing has oversight of graphic approval and vendor.
   9. Temporary Construction Screening with Dallas ISD graphics is to be paid for by an Owner's allowance of $8,000.00. Bond Marketing has oversight of graphic approval and vendor. For advertising the General Contractor and Architect can split a 6’x10’ into two (2) 6’x5’ panels for advertising. Advertising panels are to be located at the front of the campus and by the job trailer. (Refer to 3.3 in 01.50.00)
   10. Barrier requirements for minor renovation work will be discussed and agreed upon at weekly progress meetings.
   11. Comprehensive Remote Monitored Surveillance shall be provided by the contractor to be paid for by the Owner's Contingency. DISD Bond Construction Services has vendor approval. 100% Perimeter Coverage, Surveillance Cameras based on the provided Site Plan, 12 high-resolution cameras strategically placed to cover critical areas and zones within your construction site. Each camera shall be equipped with built-in infrared illumination, providing clear, high-quality images even in low-light conditions, ensuring constant vigilance regardless of time or weather. 24/7 Remote Monitoring, Advanced AI Analytics, Desktop and Mobile Web Applications, and Battery Backup system.

1.4 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to Owner, Program Manager, Architect, testing agencies, and authorities having jurisdiction.

1.5 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas (including dumpster, construction trailer, temporary fencing, silt fence, storage units and portable toilets), and parking areas for construction personnel.

B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of relevant Construction General Permit or authorities having jurisdiction, whichever is more stringent.

C. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage, including delivery, handling, and storage

provisions for materials subject to water absorption or water damage, discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water damaged Work.

1. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

D. Dust-Control and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust-control and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:

1. Locations of dust-control partitions at each phase of the work.
2. HVAC system isolation schematic drawing.
3. Other dust-control measures.
4. Waste management plan.

1.6 QUALITY ASSURANCE

A. Regulations: Comply with requirements of local laws and regulations governing construction and local industry standards, in the installation and maintenance of temporary services and facilities, including but not limited to the following:

1. Building Codes, including local requirements for permits, testing and inspections.
2. Health and safety regulations.
3. Utility company regulations and recommendations governing temporary utility services.
4. Police and Fire Department rules and recommendations.
5. Environmental protection regulations governing use of water and energy, and the control of dust, noise and other nuisances.
6. In addition, comply with “Environmental Impact” commitments the Owner or previous Owners of the site may have made to secure approval to proceed with construction of the Project.

B. Standards: Comply with the requirements of NFPA Code 241, "Safeguarding Construction, Alterations, and Demolition Operations", the ANSI A10.6 "Safety Requirements for Construction and Demolition", and the NECA National Joint Guideline NJG-6 "Temporary Job Utilities and Services".

C. Inspections: Inspect and test each service before placing temporary utilities in use. Arrange for require inspections and tests by governing authorities, and obtain required certifications, and permits for use.

D. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

1.7 PROJECT CONDITIONS

A. General: Provide each temporary service and facility ready for use at each location when the service or facility is first needed to avoid delay in performance of the Work. Maintain, expand as required and modify temporary services or facilities as needed throughout the progress of the Work. Do not remove until services or facilities are no longer needed, or are replaced by the authorized use of completed permanent facilities.

B. Conditions of Use: Operate temporary services and facilities in a safe and efficient manner. Do not overload temporary services of facilities, and do not permit them to interfere with the progress of the Work. Do not allow unsanitary conditions, public nuisances or hazardous conditions to develop or persist on the site.

C. Temporary Utilities: Do not permit the freezing of pipes, flooding or the contamination of water sources.

D. Security and Protection: Maintain site security and protection facilities in a safe, lawful and publicly acceptable manner. Take necessary measures to prevent erosion of the site.

E. The roof removal and new roof installation shall proceed on a phased basis to minimize risk to the School's ongoing operations and its property. The GC shall be responsible for protection of interior spaces from damage during roofing work.

F. Distribute material, debris, and equipment over the roof deck to avoid damage to the structural deck. Not more than two weeks supply of material shall be stored on a roof at any given time. Place materials and equipment to be stored on the roof as nearly direct over structural members as can be determined. Secure equipment, material, and debris on the roof to prevent movement by wind or other elements. Contractor assumes full responsibility for loading on the structural deck or roofing materials during roof replacement operations.

G. Consult with the A/E and the Construction Services PM regarding permission for the use of selected areas with the building. Coordination will also be held with the Principal and / or site staff.

H. Temporary Use of Permanent Facilities: Engage installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

I. Areas utilized for temporary facilities, staging area, construction access and controls, shall be reestablished to its original condition at the time of substantial completion or demobilization, whichever comes first.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide new materials and equipment for temporary services and facilities; used materials and equipment that are undamaged and in serviceable condition may be used, if acceptable to the Architect/Engineer. Provide only materials and equipment that are recognized as being suitable for the intended use, by compliance with appropriate standards.

B. Portable Chain-Link Fencing: Minimum 2-inch 0.148-inch- thick, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide galvanized steel bases for supporting posts.

C. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10 mils minimum thickness, with flame-spread rating of 15 or less per ASTM E 84.

D. Dust Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, PM, Architect, and construction personnel office activities and to accommodate project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:
   1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases. Assign one desk for the Program Manager and/or Architect, with printer and scanner access.
   2. Conference room of sufficient size to accommodate meetings of 8 individuals (minimum). Provide electrical power service and 120-V ac duplex receptacles, with not less than 1 receptacle on each wall. Furnish room with conference table, chairs, and 4-foot-square tack and marker boards.
   3. Coffee maker and supplies.
   4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
   5. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
   1. These shall be weather tight, structurally sound, compliant with applicable codes and shall be secure
   2. Store combustible materials apart from building.

D. Temporary Construction and Support Facilities: Provide facilities that can be maintained properly throughout their use at the Project site.

E. Self-Contained Toilet Units:
   1. Sanitary facilities include temporary toilets, with facilities and drinking water fixtures. Comply with governing regulations including safety and health codes for type, number, location, operation, and maintenance of fixtures and facilities; provide not less than specified requirements. Install in locations that will best serve the Project's needs.
   2. Provide single-occupant self-contained toilet units of the chemical, aerated recirculation, or combustion type, properly vented and fully enclosed with a glass fiber reinforced polyester shell or similar non-absorbent material. Provide at least one for every thirty (30) employees.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
   1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
   2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
   3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return air grille in system and remove at end of construction.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
   1. Locate facilities to limit site disturbance as specified in Division 01 Section "Summary of Work."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.
   1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
   1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

F. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
   1. Prior to commencing work, isolate the HVAC system in area where work is to be performed in accordance with approved coordination drawings.
      a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
      b. Maintain negative air pressure within work area using HEPA-equipped air filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
   2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust containment devices.
   3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

G. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction

from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

H. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner. Electrical power service to the project office trailer and other elements and areas of the Contractor’s office and staging area is to be provided by the Contractor by means of a temporary power service with a temporary account separate from the facility electrical power service.

I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

J. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line(s) for each field office.

1. Provide additional telephone lines for the following:
   a. Provide a dedicated telephone line for each facsimile machine in each field office.
2. At each telephone, post a list of important telephone numbers.
   a. Police and fire departments.
   b. Ambulance service.
   c. Contractor's home office.
   d. Architect's office.
   e. Engineers' offices.
   f. Program Manager's office.
   g. Principal subcontractors' field and home offices.
3. Provide superintendent with cellular telephone.

K. Electronic Communication Service: Provide a desktop computer in the primary field office adequate for use by Architect and Owner to access project electronic documents and maintain electronic communications. The computer should be equipped in a manner that provides effective access of project electronic documents and use of electronic communications (e-mail), printer and scanner. Wireless internet access optional.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Parking: Provide temporary parking areas for construction personnel.

C. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

1. Identification Signs: Provide Project identification signs as indicated in this section.
2. Temporary Signs: Provide other signs as indicated and as required to informing the public and individuals seeking entrance to Project.

a. Provide temporary, directional signs for construction personnel and visitors.
3. Maintain and touchup signs so they are legible at all times.
4. Two (2) 6’x10’ construction screen panels are allowed for advertising by the General Contractor and Architect. Each 6’x10’ panel can be split into two (2) 6’x5’ panels for advertising. The panel locations are at the front of the campus and by the job trailer.

D. Existing Elevator Use: Use of Owner's existing elevators will be permitted, provided elevators are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.
1. Do not load elevators beyond their rated weight capacity.
2. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.

E. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.
1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.

F. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

G. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

H. Covered Walkway: Erect protective, covered walkway for passage of individuals through or adjacent to Project site. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction and requirements indicated on Drawings.
1. Construct covered walkways using scaffold or shoring framing.
2. Provide overhead decking, protective enclosure walls, handrails, barricades, warning signs, exit signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
3. Paint and maintain appearance of walkway for duration of the Work.

I. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather tight enclosure for building exterior.
1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.

J. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate occupied areas fumes and noise.
1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant plywood on construction operations side.
2. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
3. Insulate partitions to control noise transmission to occupied areas.

4. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
5. Coordinate with Dallas ISD Bond Marketing Graphics.
6. Protect air-handling equipment.
7. Provide walk-off mats at each entrance through temporary partition.

K. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
1. Prohibit smoking on school property per State Law.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.4 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.
1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.

2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

E. TEMPORARY CONSTRUCTION SIGN

DALLAS INDEPENDENT SCHOOL DISTRICT

CONSTRUCTION SIGNS

All construction projects are required to have construction signs installed on site. Below are the guidelines for these signs.

Two Column Design (2/3+ 1/3) with vertical line between two columns.

LEFT COLUMN:

- Line 1 Centered: TYPE OF PROJECT
- Line 2 Centered: Board approved school name (all caps)
- Line 3 Centered: Type of School (Elementary, Middle, High School)
- Line 4 Centered: Street Address
- Line 5 Centered: City, TX Zip
- Line 6 Centered: DALLAS INDEPENDENT SCHOOL DISTRICT
- Line 7 Left Justified: TRUSTEE
- Line 8 Left Justified: NAME OF SCHOOL'S TRUSTEE
- Line 9 Left Justified: PROGRAM MANAGER
- Line 10 Left justified: Name of Program Manager firm
- Line 11 Left justified: ARCHITECT
- Line 12 Left justified: Name of Architecture firm
- Line 13 Left justified: CONTRACTOR
- Line 14 Left justified: Name of Contractor

RIGHT COLUMN:

- Top of column centered: Dallas ISD logo
- Line 1 Centered: BOARD OF TRUSTEES
  [all names should be persons in these positions when the construction contract was approved by the Dallas ISD Board]
- Lines 2-10: Board of Trustees in this order and style
- Name, President, District
- Name, First Vice President, District
- Name, Second Vice President, District
- Name, Secretary, District
- Name, District
- Name, District
- Name, District
- Name, District
- Name, District
- *INSERT SPACING*
- Line 11: ADMINISTRATION
- Line 12: Name, Superintendent of Schools
- Line 13: Name, Chief Operatons Officer
- Line 14: Name, Title of person heading Construction

DALLAS ISD CAMPUS SIGNAGE REQUIREMENTS FOR SCHOOL DESIGN TEAMS

3.6 GROUNDBREAKING CEREMONY (New Schools Only)

A. At a time designated by the Owner after project award, the Owner will conduct a groundbreaking ceremony on the project site. The General Contractor will provide support and materials to the Owner for purposes of conducting that ceremony. This support will include providing, but may not be limited to, the following;

1. Land movers to be on site as a backdrop to the groundbreaking.

2. Sandpit at a location coordinated with the owner.
3. Collection of shovels and hardhats from the Construction Services office and transport them to the groundbreaking ceremony.
4. Cleaning and transportation of shovels and hardhats to the Construction Services office after the groundbreaking ceremony.
5. Bottled water for participants.
6. Temporary chairs and tables to seat up to one hundred attendees.
7. All weather access to the site and sandpit.

END OF SECTION 01 50 00

SECTION 01 52 14 - TEMPORARY FACILITIES FOR STUDENTS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 00 and 01 Specification Sections, apply to this section.

1.2 SUMMARY

A. Section includes requirements for temporary facilities (Swing Space) for the purpose of relocating students to provide temporary classroom facilities during construction activities.

B. Related Sections:
   1. Division 00 Section titled “Technical Proposal”
   2. Division 01 Section title “Temporary Facilities and Controls”

1.3 DESCRIPTION OF REQUIREMENTS

Since the school buildings will be in use during construction, the Work shall be conducted in phases as proposed in the phasing drawings. Contractor will provide temporary classroom buildings for swing space, per the requirements indicated in this section. Contractor will provide moving services to relocate movable classroom furnishings, fixtures and/or equipment in/out of each phased zone. The number of temporary buildings and classrooms which will be made available during the project shall not exceed the numbers summarized below:

SWING SPACE TYPE	ORG # N/A
Maximum External Temporary Swing Space Classrooms (to be provided by Contractor)	N/A
Maximum Temporary Restrooms	N/A
Swing Space Classrooms Provided Within Existing Facilities	N/A

The Contractor can submit, as part of the proposal, alternate phasing plans that can potentially save the District time and money.

If no external or internal temporary swing space classrooms are indicated above, then Contractor will be required to schedule work during holidays, weekends, or hours other than regular school hours, and price its work accordingly. A Dallas ISD representative must be present at the school during times that the Contractor is working at the school site. Contractor will be responsible for overtime costs for Dallas ISD staff for presence at the school site outside normal hours of school operation, including holidays.

A. If students must be displaced from classroom areas due to the phasing and execution of the work according to the Contractor’s work plan, the Contractor shall be responsible for providing, on a turn-key basis, temporary facilities for those displaced students.
B. If the Contractor elects to utilize Swing Space, they must include all costs associated with the removal, transportation, installation and dismantling, including, but not limited to:
   1. Equipment relocation
   2. Transport and setup
   3. Maintenance of the temporary facilities for the duration of their use (i.e. HVAC,

electrical, and other building repair and maintenance needed, not custodial maintenance)
4. Site work and utilities
5. ADA/TAS Accessible ramps and sidewalks
6. Stairs
7. Skirting
8. Interior finish-out
9. Miscellaneous specialties (i.e. marker boards, tack boards, flag holders, map clips, fire extinguishers)
10. Signage
11. Wall Clock and bell to interface with the existing system at the school
12. Coordination with movers for relocation of Furnishings, Fixtures, and Equipment (FF&E)
13. Breakdown, removal, and transport of the Swing Space at the completion of its use
14. Restoration of the site following removal of facilities
15. P.A. to interface with the existing system at the school

1.4 SCOPE OF WORK

The intent of this scope item is for the Contractor to dismantle and remove the District's existing portable building at the site(s) identified in this section, and relocate to the campus requiring swing space as identified in Section 10.7. Contractor shall be responsible for a turnkey dismantling, transportation and setup of these portable buildings.

Schools with existing portables to be utilized for this project and the portable count are as follows:

Name of School	Portable Details (Include ID# and Single/Double)
N/A	N/A

Removal of Existing Portables from Other Schools. Contractor shall provide an advance notice of at least five (5) days to the School Principal and the Program Manager before the temporary buildings are expected to be dismantled and demobilized from any of the above sites. Scope may also involve demolition of sidewalks, canopies, electrical, technology pathways as identified in the contract documents. Again, the intent of this scope of work is for the contractor to provide turnkey dismantling, and removal of identified portables and associated infrastructure. Refurbish site(s) where portables / sidewalks are removed.

Removal of Existing Portables scheduled for Demolition in the footprint of Construction or Staging. If a portable needs to be demolished because it is in the footprint of construction or staging, any necessary Abatement will be the responsibility of the Contractor. After any necessary Abatement, the GC will be responsible for the demolition and removal/disposal of the debris remaining. Refurbish site(s) where portables / sidewalks are removed.

Removal of Existing Portables Not Scheduled for Demolition in the footprint of Construction or Staging. If it is necessary to remove a portable building due to construction or staging at a campus and it is not scheduled for demolition, the GC will be responsible to disassemble, disconnect the portable, and deliver it and set it on blocks at a location designated by Dallas ISD Maintenance (this could be another campus). This would only require that the GC set the building in the designated location, set on blocks, level, etc. Maintenance will be responsible for setting the portable up (Skirting, walkways, utilities, fire alarm hookup, etc.) at the new location and Maintenance will also be responsible for picking up the awnings, skirting and other related items that had to be disassembled at the original location. Maintenance will also be responsible for authorizing the disconnect and any re-connect of the utilities with their requested move of portables. Where portables were removed for staging, refurbish site(s) to match existent surrounding conditions.

Portables designated to be relocated into another Dallas ISD Location If there is a Dallas ISD portable that is designated to be moved from a Dallas ISD location to a campus needing Swing Space – The GC (with contract for the campus needing the swing space) would be responsible for the disconnecting of any utilities and cabling for fire and technology. The GC, who is to move the building for swing space, will be responsible for the removal of awnings, porches, skirting, etc. and be responsible for the removal of the debris. The General Contractor would then be responsible for re-grading the area. The General Contractor would then be responsible to pick up the completely disconnected portable(s) and transport it (them) to the campus they are assigned by Dallas ISD Construction Services office and then be responsible for the setup and complete reconnection of all utilities, fire alarm, technology, etc. that would match Dallas ISD requirements. At the point the work is complete and/or the swing space is no longer necessary, the GC would be responsible for the disconnect and moving to a location designated by the Dallas ISD and would have no requirement other than to secure the moving permit and to set the portable(s) securely in place. The General Contractor would have responsibility to remove any debris from that disconnect and removal. The General Contractor is responsible for all permitting required to install the portable buildings.
NOTE: In all cases involving swing space, the Campus Principal and Facilities must be appropriately and timely notified and aware of swing space issues, including determination and disposition of portable contents.

Transportation of Existing Portables from Other Schools to the Project. Contractor shall provide turnkey transportation services, including management of any required permits, for safe transportation of existing portables from any of the above site to the project. Any removal and replacement of any fencing, or other obstacles for relocation of such buildings shall be the responsibility of the Contractor.

Installation of Portables at the Project. Provide turnkey services for delivery, set-up, maintenance, removal, and restoration of the site for temporary classroom buildings to accommodate phased construction for the Dallas ISD Construction Services office

A. Engineering: The Contractor will provide site engineered civil, utility, blocking plan/foundation plan, sidewalk design and deck/ramp design sufficient to receive a Building Permit from the City, for each site for the installation of all temporary classroom buildings. Existing canopies, sidewalks, foundation details, technology, fire alarm etc. at the schools may be used as a guide for the scope expectations also.

B. Location: The locations of the temporary classrooms are as indicated on the site plan drawings.

C. Permits: The Contractor will coordinate and obtain the permits as required by the City for placement of the classroom buildings at each site. This includes the permits required for the transportation of the classroom buildings.

D. Temp. Facilities: Roll off dumpsters will be provided by the Contractor as required for clean-up during installation and removal of swing space.

E. Clean up: Final broom sweep of the building(s) and removal of trash and debris from each site will be provided by the Contractor prior to occupancy of the swing space by the students and staff. Floor waxing or shampooing will be provided be the Contractor prior to occupancy by the students and staff. Provisions for site restoration upon completion of the delivery of the modules and/or completion of the scope of work will be provided by the Contractor. Upon the removal of the buildings all underground utilities and/or structures associated with the temporary classroom buildings will be removed and discarded. The concrete sidewalks will be removed and discarded. Rough grading will be performed and new sod will be placed to restore the area to its original condition.

F. Site Preparation: Dallas ISD has made no provisions for any site preparation and/or demolition as may be required for the delivery and/or installation of the portable buildings. Any site preparation and/or demolition that might be required of for installation of the temporary classrooms will be included in the Contractor's scope.

G. Construction Fencing: The contractor will maintain a clean and safe site environment within the limits of the temporary classroom construction area. Temporary chain link construction fencing 6' high will be installed around the perimeter of the limits of construction.

H. Sodding: Upon the removal of the buildings, the Contractor will provide sod within the limits of construction associated with the temporary classroom scope of work. Any irrigation of the new sod will be provided by Dallas ISD.

I. Site Utilities (if applicable): The Contractor will provide the site utility connections required for the temporary classroom buildings. The Contractor is responsible for consulting with the City regarding requirements for restrooms on school projects that are located in cities other than Dallas. If required by those cities, the Contractor must provide restroom services and utilities as required by local code.

J. Storm: All storm water management and any sedimentation control will be the responsibility of the Contractor. Gutters and downspouts will be installed as needed by the Contractor.

K. Sanitary (if applicable): The Contractor will install all fixtures, stub all sanitary lines below the floor and manifold to one location at the edge of the building(s). All final connections, utility company charges and impact fees that might be required will be included in the Contractor's scope of work. The Contractor is responsible for consulting with the City regarding requirements for restrooms on school projects that are located in cities other than Dallas. If required by those cities, the Contractor must provide restroom services and utilities as required by local code.

L. Water (if applicable): The Contractor will install all fixtures and stub all water lines to one location at the edge of the building(s). All final connections, utility company charges and impact that might be required will be included in the Contractor's scope of work. The Contractor is responsible for consulting with the City regarding requirements for restrooms on school projects that are located in cities other than Dallas. If required by those cities, the Contractor must provide restroom services and utilities as required by local code.

M. Natural Gas: No provisions for any gas service are anticipated at the present time.

N. Life Safety: Building(s) will be approved and inspected by the Texas Department of Licensing and Regulation. Any provisions for fire suppression, fire sprinkler system or fire rated assemblies that might be required will be included in the Contractor's scope of work.

O. Fire Alarm: The contractor will provide and install fire detection systems as required by the building code and the City.

P. Electrical: The contractor will provide and install electrical systems as required by the building code and the City. Installation and electricity consumption costs associated with the swing space will be the financial responsibility of the Contractor.

Q. Mechanical: The Contractor will supply and install the standard end mount HVAC units. The condensate from both HVAC units of a classroom building will harnessed together and discharged into a 24" diameter by 36" deep french drain filled with gravel. All

condensate piping will be PVC but will be protected where directly exposed to UV radiation.

R. Internet Access: The Contractor will provide wireless internet access appropriate for the swing space. Portable technology connectivity shall be coordinated with the Technology Department.

S. Skirting: After the modules are installed, the Contractor will install full perimeter skirting around the building(s) using the same material and finish as that of the building siding to provide a consistent finish down to grade. Sections of skirting will be perforated as required for proper crawl space ventilation. Access to the crawl space will be accomplished by removing sections of the skirting.

T. Decks/Stairs: The Contractor will install landings at the exit doors of the building(s) within the limits of construction as required by code and the City. Landings will utilize pressure treated wood construction with slip resistant surface treatment and handrails.

U. Ramps: The Contractor will install handicapped accessible ramps at the exit doors of the building(s) within the limits of construction as required by code and the Local City. Ramps will utilize pressure treated wood construction with slip resistant surface treatment and handrails.

V. Sidewalks: The Contractor will install 4' wide, 4" thick, 3,000 psi concrete sidewalks to service the building(s) within the limits of construction. Sidewalks will receive a light broom finish and be poured on select fill and/or sand bed.

W. Foundation and Anchorage: The swing space facilities should be securely anchored to a foundation system which utilizes some means of structural support, as determined by a certified structural engineer. Provide construction documents that depict the foundation system as designed and certified by a structural engineer.

X. Hitch/Tires/Axles: Hitches will be removed and stored under building while tires and axles are to remain on the modules. Tires and axles will be removed only if necessary to complete the building installation due to site constraints and will also be placed under the modules.

Y. Keys. Contractor shall coordinate with the District for re-keying of all swing space buildings. Provide 10 sets of keys for each building. Doors shall be provided with hardware to enable locking of the buildings from the inside also, and shall have vandal resistant hardware.

Dismantling / Removal of Temporary Buildings upon Completion of Work. Contractor shall demobilize/dismantle/ remove the temporary buildings from site only upon mutual agreement with the Program Manager and Dallas ISD. The temporary buildings shall not be removed from site unless the classrooms that are being renovated under the “Work” of the Contract have been substantially completed and all system upgrades/installation/repairs are completed to accommodate students. Under no circumstances shall the temporary buildings be demobilized if it is deemed by the Program Manager and Dallas ISD that student safety is a potential issue or if the demobilization is likely to adversely impact the student instruction schedule. Contractor shall provide an advance notice of at least five (5) days to the School Principal and the Program Manager before the temporary buildings are expected to be dismantled and demobilized from the site.

Maintenance and Final Cleaning. Dallas ISD will be responsible for the day-to-day cleaning and janitorial services such as floor cleaning, floor vacuuming, trash removal, etc. Contractor shall be responsible for other maintenance of the temporary buildings, including vandalism.

Maintenance of building structure and systems (HVAC, Plumbing, Electrical, Lighting, etc.), for the duration that the buildings are on the School site shall be the responsibility of the Contractor. Contractor shall be responsible for rendering the Project site to its original condition after removal of the temporary buildings, including cleaning and grading and ground cover, termination of the temporary facilities and connections per the requirements of the Owner, the City of Dallas and/or the relevant Government Agency or applicable code. Removal of foundations for the buildings, sidewalks, canopies, ramps etc. will be the responsibility of the Contractor.

Coordination with Project Schedule and Phasing Plan. Contractor shall provide a detailed schedule listing all relevant milestones for the installation and dismantling of swing space buildings as part of the overall project schedule. Activities may include, but are not limited to:

1. Texas Accessibility Standards (TAS) submittals, if required,
2. Procurement of permit to transport the prefabricated buildings from another school to the Project site,
3. Procurement and delivery of the prefabricated temporary buildings,
4. Coordination with the power, water, sanitary sewer and any other applicable utility companies to obtain permits and procure additional primary connections, if required.
5. Installation of canopies, sidewalks, fire alarm systems etc.

Lack of understanding of involved coordination and approval processes, and delays caused thereby shall not be grounds for claim(s) for any contract time extension(s). Contractor shall assume a reasonable time frame from the date of issuance of the Notice To Proceed for the installation of these swing space buildings, and coordinate the timing for the delivery and installation of the temporary classroom buildings with the Project schedule.

END OF SECTION 01 52 14

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Sections:

1. Division 01 Section "Allowances" for products selected under an allowance.
2. Division 01 Section "Alternates" for products selected under an alternate.
3. Division 01 Section "Substitution Procedures" for requests for substitutions.
4. Division 01 Section "References" for applicable industry standards for products specified.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

a. Form of Approval: As specified in Division 01 Section "Submittal Procedures."
b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weather tight enclosure above ground, with ventilation adequate to prevent condensation.

4. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
2. Refer to Divisions 02 through 49. Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Products:

    a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered, unless otherwise indicated.

3. Manufacturers:

    a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered, unless otherwise indicated.
    b. Non-restricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

4. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 60 00

SECTION 01 73 00 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Installation of the Work.
3. Cutting and patching.
4. Coordination of Owner-installed products.
5. Progress cleaning.
6. Starting and adjusting.
7. Protection of installed construction.
8. Correction of the Work.

B. Related Sections:

1. Division 01 Section "Submittal Procedures" for submitting surveys.
2. Division 02 Section "Selective Structure Demolition" for demolition and removal of selected portions of the building.
3. Division–07 Section "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

A. Cutting and Patching Plan: Submit plan describing procedures at least 5 days prior to the time cutting and patching will be performed. Include the following information:

1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.

3. Products: List products to be used for patching and firms or entities that will perform patching work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate how long services and systems will be disrupted.

1.5 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from the Architect before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection

2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that will result in increased maintenance or decreased operational life or safety. Operational elements may include the following:

    a. Primary operational systems and equipment.
    b. Fire separation assemblies.
    c. Air or smoke barriers.
    d. Fire-suppression systems.
    e. Mechanical systems piping and ducts.
    f. Control systems.
    g. Communication systems.
    h. Conveying systems.
    i. Electrical wiring systems.
    j. Operating systems of special construction.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, reduce their capacity to perform as intended, or that will result in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:

    a. Water, moisture, or vapor barriers.
    b. Membranes and flashings.
    c. Exterior curtain-wall construction.
    d. Equipment supports.
    e. Piping, ductwork, vessels, and equipment.
    f. Noise- and vibration-control elements and systems.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

B. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

1.6 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to the Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
3. Contractor shall be responsible for locating all underground utility lines that may be affected by the Work, including but not limited to use of technologies such as Ground Penetrating Radar (GPR). Contractor shall provide a report showing location of existing utilities before pre-dig meeting and shall retain a hard color copy of the report on site at all times. Contractor shall maintain the site markings through the duration of the project. Contractor is responsible for protecting all utility lines (underground and above ground) while performing work. Any damaged utility lines will be replaced by the Contractor at no cost to the Owner.

4. Prior to starting work, Contractor shall review and provide a report that documents operations of existing systems, including but not limited to fire alarm, security, and PA. Contractor shall also record and provide screenshots of all existing mechanical equipment and controls, from the Owner's front end operating system.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
4. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility company that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of the Contractor, submit a request for information to Architect according to requirements in Division 01 Section "Project Management and Coordination."

D. Surface and Substrate Preparation: Comply with manufacturer's recommendations for preparation of substrates to receive subsequent work.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. General: Engage a professional engineer to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
3. Inform installers of lines and levels to which they must comply.
4. Check the location, level and plumb, of every major element as the Work progresses.

5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect and Program Manager. Submit log at project completion for project records.

3.4 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
4. Maintain minimum headroom clearance of **96 inches** in occupied spaces and **90 inches** in unoccupied spaces.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Contractor shall provide filters for all mechanical equipment (new and existing) impacted by the Contractor’s scope of work, at minimum, at the following stages of construction;
1. Construction filters at the start of construction, and as needed through-out the project to maintain proper air flow
2. MERV filters at the start of Test & Balance
3. MERV filters at Substantial Completion (filters to be dated and provide photo documentation)

D. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

E. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

F. Tools and Equipment: Do not use tools or equipment that produces harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.5 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

2. Cut the work using methods that are least likely to damage work to be retained or adjoining work. Where possible review proposed procedures with the original installer; comply with the original installer’s recommendations.

B. Temporary Support: Provide temporary support of work to be cut.

C. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

D. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements of Division 01 Section "Summary."

E. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or re-hang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather-tight condition.
6. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

3.6 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.

1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually

agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.

2. Pre-installation Conferences: Include Owner's construction personnel at pre-installation conferences covering portions of the Work that are to receive Owner's work. Attend pre-installation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.7 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Provide necessary daily cleaning during construction to maintain premises and adjoining public properties free from construction waste, debris and rubbish, and dust caused by operations.
2. At completion of each day, remove waste materials and rubbish; store tools, equipment, machinery and surplus materials; and clean all sight exposed surfaces.
3. If Contractor fails to clean up each day and at the completion of his Work, the Owner may do so and charge the cost thereof to the Contractor. At his next pay application a deductive change order will be processed and there is no appeal for back charges due to clean up.
4. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
5. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
6. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
   a. Utilize containers intended for holding waste materials of type to be stored.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Cleaning Materials: Use only cleaning materials recommended by manufacturer of the surface to be cleaned. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

F. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

G. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

H. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.

I. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

J. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

K. Limiting Exposures: Supervise construction operations to assure that no part of the construction, whether completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

L. During Construction:
1. Oversee cleaning and ensure that building(s) and ground(s) are maintained free from accumulations of waste materials and rubbish.
2. Sprinkle dusty debris with water.
3. During progress of Work, clean-up site and access and dispose off waste materials, rubbish and debris at least once every week.
4. Provide dump containers and locate on site for collection of waste materials, rubbish and debris on a daily basis.
5. Do not allow waste materials, rubbish and debris to accumulate and become an unsightly or hazardous condition.
6. Remove waste materials, rubbish and debris from site and legally dispose off at public or private dumping area.
7. Lower waste materials in controlled manner with as few handlings as possible; do not drop or throw materials from heights.
8. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.

3.8 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Division 01 Section "Quality Requirements."

3.9 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.10 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01 73 00

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion.
2. Final completion.
3. Warranties.
4. Final cleaning.

B. Related Sections:
1. Division 01 Section "Execution" for progress cleaning of Project site.
2. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
3. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
4. Division 01 Section "Demonstration and Training" for requirements for instructing Owner's personnel.
5. Divisions 02 through 49 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete with request.

1. Prepare a list of items to be completed and corrected (punch list), the value of item on the list, and reasons why the Work is not complete.
2. Advise the Owner of pending insurance changeover requirement.
3. Grant the Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits and similar releases.
4. Complete startup testing of systems.
5. Complete Owner’s Training. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
6. Complete final cleaning requirements, including touch-up painting.
7. Submit specific warranties 14 days after Substantial Completion.
8. Submit sign-in sheets from training sessions
9. Submit one (1) electronic copy of Operation & Maintenance (O&M) Manuals

1.4 FINAL COMPLETION – **Please refer to Attached "General Contractor Close out and Hazmat Abatement Close Out checklist" at the end of this section.**

A. Preliminary Procedures: Before requesting final inspection for determining final completion, the items listed in 1.3 of this section must be complete. The Contractor must also complete the following:

1. Submit final certifications, and similar close-out documents.
2. Prepare and submit Project Record Documents, including construction photographs, damage or settlement surveys, property surveys, and similar record information.
3. Submit test/adjust/balance report records.
4. Terminate and remove temporary facilities from project site, along with mockups, construction tools, and similar elements.
5. Complete final cleaning and repair of all areas, including touch-up painting.
6. Submit final close-out submittals.
7. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."
8. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.

B. Close-out submittals include, but are not necessarily limited to, as applicable:

1. Project Record Documents described in Section 01 78 39.
2. Certification of Substantial Completion (AIA Form G704)
3. Certificate of Final Completion (Exhibit D – Form of Final Completion Notice)
4. Certificate of Final Acceptance by the Architect (Exhibit H of the A/E Agreement – Form of Final Completion Certification with punch list sign-off)
5. Certificate of Final Completion by the Program Manager (Exhibit C of the PM Agreement – Form of Final Completion Certificate)
6. TEA Certificate of Project Compliance.
7. Final Change Order.
8. Final Acceptance for Payment to include acceptance of Final Change Order and therefore no work or retainage outstanding
9. Consent of Surety to Final Payment
10. City's Certificate of Occupancy
11. Contractor's Final Affidavit of Release of Liens
12. Contractor's Guarantee
13. Letter from Contractor listing all subcontractors and suppliers with contact information.
14. Transmittal listing Keys: Contractor shall prepare an itemized key list in complete detail ending in a statement that the keys were turned over, the Contractor's signature, a line stating that the keys were received and the receiver's signature. Copies of this list should be retained by the Contractor and receiver and a copy sent to the Architect, PM and Owner. Keys should be identified with tags corresponding to the approved room number designation.
15. Operating, Instruction and Maintenance Manuals for Equipment. For records, provide one (1) paper copy of all O&M manuals at final closeout.
16. Verification of training conducted: Provide copy of sign-in sheet. For records, provide one (1) DVD copy of all training sessions at final closeout.
17. Final approved submittals for HVAC Controls System, Data Cabling System, and Fire Alarm System, and Security System.

Refer to Attached "General Contractor Close out checklist" at the end of this section.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

    a. Project name.
    b. Date.
    c. Name of Contractor.
    d. Page number.

4. Submit list of incomplete items in the following format:

    a. PDF electronic file.

1.6 WARRANTIES

A. Submittal Time: All warranties shall commence on the date of substantial completion and copies of the Warranties be submitted no later than 14 days after substantial completion.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide table of contents at beginning of document. Coordinate paragraph below if Division 01 Section "Operation and Maintenance Data" is used.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

D. Refer to attached checklist of warranties and close out customized by the Architect for each campus.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Remove tools, construction equipment, machinery, and surplus material from Project site.
d. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
e. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
f. Sweep concrete floors broom clean in unoccupied spaces.
g. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
h. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
i. Remove labels that are not permanent.
j. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

1) Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates.

k. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
l. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
m. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

n. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter upon inspection.

1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report upon completion of cleaning.

o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

p. Leave Project clean and ready for occupancy.

C. Construction Waste Disposal: Comply with waste disposal requirements in Division 01 Section "Temporary Facilities and Controls."

GC CLOSEOUT CHECKLIST

General Contractor Close-out Checklist

To:	<<Name>> Project Manager, Dallas ISD	**Date:**	
GC:	<<Name of GC Firm>>	**A/E Firm:**	<<Name of A/E Firm>>
Org#:	xxxx	**PM:**	<<Name of PM Firm>>
School Name			
Project Type:		Addition	Renovations	New Construction

Item #	Document Description	Primary Responsibility	Tab #	Check-Off	Remarks
I.	**FINANCIAL RECONCILIATION / FINAL PAYMENT REQUIREMENTS**				
a.	Copies of Reconciliation to Dallas ISD Financial System and Copy of Final Payment	PM			PM will collect for close-out
b.	Certificate(s) of Insurance including General Liability and (Pollution and/or Professional Liability if applicable)	PM			PM will collect for close-out
c.	Insurance Requirements at Final Completion Statement	PM			PM will collect for close-out
d.	Copy of Final Change Order	PM			PM will collect for close-out
e.	Copies of all executed Change Orders	PM			PM will collect for close-out
f.	Copies of all executed CAEAs and CAELs	PM			PM will collect for close-out with back-up information
g.	Copies of all executed AERAs	PM			PM will collect for close-out with back-up information
h.	Copies of all executed custodian overtime authorizations (Summary Recap (Hrs.)	PM			PM will collect for close-out. Include as deductive CAEA
i.	Confirmation of back charge for Prolog Converge licenses & Custodian Overtime	PM			PM will collect for close-out. Include as deductive CAEA
j.	Confirmation of back charge for technology refund (ERATE), if applicable	PM			PM will collect for close-out. Include as deductive CAEA
k.	MWBE Contract Closeout Evaluation Form	PM			PM will collect for close-out. Include final MWBE payment status report
II.	**PAYMENT AND PERFORMANCE BONDS**				
a.	"Consent of Surety Company to Final Payment"; AIA G707 (Confirm that Power of Attorney is attached to form.)	GC			
III.	**EVIDENCE OF PAYMENT OF DEBTS AND CLAIMS**				
a.	"Contractor's Affidavit of Payment of Debts and Claims" AIA G706	GC			
IV.	**SUBSTANTIAL COMPLETION**				
a.	AIA G704 - Certificate of Substantial Completion	A/E Dallas ISD PM			
b.	Punchlist - Issued at substantial completion	GC			
c.	Exhibit G - Form of Substantial Completion Certification	A/E			This is an Exhibit in the A/E Agreement
V.	**FINAL COMPLETION**				
a.	Exhibit H - Form of Final Competion Certification - with signed off punchlist	A/E			This is an Exhibit in the A/E Agreement
b.	TDLR - RAS report approved or A/E Letter	A/E			If the RAS report shows deficiencies, the A/E will have to confirm/explain and/or justify corrections
c.	Attachment C - Form of Program Manager's Final Completion Certificate	PM			This is an Exhibit in the PM Agreement
d.	Exhibit D - Form of Contractor's Final Completion Notice	GC			
e.	TEA - Certification of Project Compliance	A/E GC Dallas ISD PM			PM will coordinate the sign-off on this document.
VI.	**OPERATIONS AND MAINTENANCE MANUALS AND EVIDENCE OF TRAINING**				
a.	A/E's O&M Manuals confirmation letter.	GC			
b.	O&M Manuals submitted by GC to A/E	GC			Per detailed list developed by GC and reviewed by A/E and PM. One Manual per each school to be split by CSI Divisions
c.	Training Matrix, Sign-In sheet(s) and DVDs.	GC			GC is to provide a sign-in sheet for each system for which training has been provided to indicate the person, title and date of completion of the
VII.	**ATTIC STOCK / SPARE MATERIAL / KEY TRANSFER**				
a.	Signed off Transmittal Attic stock & spare material	GC			Provided by GC and received by Principal or Campus Facility Supervisor or Maintenance, as applicable
b.	Signed off Transmittal Key transfer (Accessory keys)	GC			Provided by GC and received by Principal or Campus Facilities Supervisor, as applicable
VIII.	**WARRANTIES - By SYSTEM (MEP, Fire alarm, Fire sprinkler, Roofing, Security, etc.)**				
a.	Exhibit B - Form of Contractor's Guarantee	GC			
b.	Exhibit B-2- Certification of Compliance with Contract Documents.	GC			
c.	Manufacturer's Warranty(ies)	GC			A separate "Warranties" manual should be provided for guarantees, warranties, etc.
d.	List of Subcontractors and Suppliers	GC			

IX.	**LOCAL AGENCIES APPROVALS (as applicable)**					
a.	City of Dallas - Certificate of Occupancy	GC				
b.	City of Dallas - Final Inspections (Building)	GC			Green tags colored copies	
c.	Storm Water Prevention Polution Plan, SWPPP	GC				
d.	Elevator Inspection Certificate	GC				
e.	Boiler Inspection Certificate	GC				
f.	Health Department Inspection Certificate	GC				
X.	**RECORD DOCUMENTS (DRAWINGS, SPECIFICATIONS, ETC.)**					
a.	Record Documents transmittal from GC to A/E	GC			GC is to update red-lined record drawings on a monthly basis. Final red-line record set to be provided to A/E.	
b.	A/E's receipt of Record Documents Letter	A/E			A/E is to provide a letter indicating that all record documents have been provided by the G.C.	
XI.	**GC DESIGNED DOCUMENTS**					
a.	Fire Alarm drawings	GC			Need Govermental Agency approved documents.	
b.	Security drawings	GC			Need Govermental Agency approved documents.	
c.	HVAC Controls drawings	GC			Need Govermental Agency approved documents.	
d.	Fire Sprinkler System drawings	GC			Need Govermental Agency approved documents.	
e.	Data Cabling drawings	GC			Need Govermental Agency approved documents.	
XII.	**CERTIFICATIONS**					
a.	Certification of Asbestos Free Project: Letter from GC as per AIA A201 13.11.1	GC				
b.	Certification of Lead-Free Potable Water System: Letter from GC as per AIA A201 13.12.1	GC				
XIII.	**FINAL SYSTEM REPORTS**					
a.	Final Test & Balance Report	T&B				
b.	Final Roof Inspection Report	Roof Inspector				
c.	Final HVAC Controls - CMCS Report	Dallas ISD Facilities				
XIV.	**WARRANTY INSPECTIONS**					
a.	6 month inspection shall be conducted no later than: <<Date>>					
b.	11 month inspecton shall be conducted no later than: <<Date>>					
XV.	**ACKNOWLEDGE STATEMENT**					
a.	Project Completion Acknowledgement - Signed and dated by School Principal	PM				
b.	Project Completion Notification to Dallas ISD Facilities.	Dallas ISD Project				

I have submitted the close-out documentation in compliance with applicable contract:

G.C. Firm	Print Name	Signature	Date

I have reviewed and acknowledge receipt of the close-out documentation submitted by the General Contractor and found it complete and in compliance with applicable contracts:

A/E Firm	Print Name	Signature	Date

I have reviewed and acknowledge receipt of the close-out documentation submitted by the General Contractor and the A/E and found it complete and in compliance with applicable contracts:

Program Manager	Print Name	Signature	Date

I have reviewed and acknowledge receipt of the close-out documentation submitted by the General Contractor, A/E and PM and found it complete and in compliance with applicable contracts:

Dallas Independent School District

Owner	Print Name	Signature	Date

HAZMAT CONTRACTOR CLOSE-OUT CHECKLIST

TO:	xxxxxxxxxxxxxxx, Contract Manager, DALLAS ISD	DATE:	
CONTRACTOR:		PM/F:	
PROJECT ID / ORG:		EXTENT OF ABATEMENT:	☐ COMPLETE ☐ SPOT ☐ OTHER
CAMPUS:			
PURCHASE ORDER(S):			
PROJECT TYPE:	☐ Abatement of Exist. Bldgs in Acquired Land ☐ Abatement for Renovation Projects		

ITEM/ TAB	DOCUMENT DESCRIPTION	PRIMARY RESP	RECEIVED	REMARKS
I.	**PROJECT DOCUMENTATION and/or EVIDENCE OF COMPLIANCE**			
a.	OSHA Sampling			
b.	Waste Manifest			
c.	Daily work logs			
d.	Daily sign-in sheets			
e.	Asbestos Licensing			
f.	Respirator fit tests			
g.	Accident Report(s)			
h.	Notifications			
i.	Medical Records			
j.	Confirmation of Receipt - Letter of Completion Document	ENVIR DEPT		

I have submitted the close-out documentation in compliance with applicable contract:

JOC HAZMAT CONSTRUCTION FIRM	PRINT NAME	SIGNATURE	DATE
0			

I have reviewed and acknowledge receipt of the close-out documentation submitted by the General Contractor and found it complete and in compliance with applicable contracts:

JOC HAZMAT CONSULTANT FIRM	PRINT NAME	SIGNATURE	DATE

END OF SECTION 01 77 00

SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Operation manuals for systems, subsystems, and equipment.
3. Product maintenance manuals.
4. Systems and equipment maintenance manuals.

B. Related Sections:
1. Division 01 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
2. Division 02 Section “Demonstration and Training” for instructing Owner’s personnel in the maintenance of the products and in the operation of equipment and systems.
3. Divisions 02 through 49 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual specification sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Where applicable, clarify and update reviewed manual content to correspond to modifications and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically-indexed file. Submit on digital media acceptable to Architect and Program Manager.

a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically-linked operation and maintenance directory.
b. Enable inserted reviewer comments on draft submittals.

2. For Facilities use, provide one (1) PDF Electronic File of all O&M manuals at substantial completion. For Permanent Records, provide one (1) paper copy of all O&M manuals at final closeout.

3. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves for paper copy. Architect will return PDF Electronic File and paper copy.

C. Initial Manual Submittal: Submit draft PDF copy of each manual at least 30 calendar days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.

D. Final Manual Submittal: Submit each manual in final form as a PDF prior to requesting inspection for Substantial Completion and at least 10 calendar days before commencing demonstration and training. Architect will return copy with comments.

1. Correct or modify each manual to comply with Architect and Program Manager's Comments. Submit copy of each corrected manual within 10 days of receipt of Comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Organization: Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Architect.
7. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Enable bookmarking of individual documents based upon file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel upon opening file.

F. Manuals, Paper Copy: Submit manual in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of content. Indicate volume number for each of the three required multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor is delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in the manual, identify them by product name, and arrange to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in the manual, identify by product name and arrange to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

B. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

C. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

D. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.
2. Comply with requirements of newly prepared record Drawings in Division 01 Section "Project Record Documents."

E. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 78 23

SECTION 01 78 39 - PROJECT AS-BUILTS & RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.
4. Miscellaneous record submittals.

B. Related Sections:
1. Division 01 Section "Execution" for final property survey.
2. Division 01 Section "Closeout Procedures" for general closeout procedures.
3. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
4. Divisions 02 through 49 Sections for specific requirements for project record documents of the Work in those Sections.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set(s) of marked-up record prints.
2. Number of Copies: Submit copies of record Drawings as follows:

a. Initial Submittal: Submit two paper copies set as well as PDF electronic files of marked-up record prints and two sets of plots from corrected record digital data files. Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
b. Final Submittal: Submit two paper copies set as well as PDF electronic files of marked-up record prints. Print each Drawing, whether or not changes and additional information were recorded.

B. Record Specifications: Submit two paper copies as well as PDF electronic files of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one paper copy set as well as PDF electronic files of each submittal.

1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

D. Miscellaneous Record Submittals: Refer to other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one paper copy set as well as PDF electronic files of each submittal.

E. Reports: Submit written report weekly indicating items incorporated in Project record documents concurrent with progress of the Work, including modifications, concealed conditions, field changes, product selections, and other notations incorporated.

PART 2 - PRODUCTS

2.1 As-Built Drawings

A. As-Built Drawings: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

    a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    b. Accurately record information in an acceptable drawing technique.
    c. Record data as soon as possible after obtaining it.
    d. Record and check the markup before enclosing concealed installations.
    e. Cross-reference record prints to corresponding archive photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:

    a. Dimensional changes to Drawings.
    b. Revisions to details shown on Drawings.
    c. Depths of foundations below first floor.
    d. Locations and depths of underground utilities.
    e. Revisions to routing of piping and conduits.
    f. Revisions to electrical circuitry.
    g. Actual equipment locations.
    h. Duct size and routing.
    i. Locations of concealed internal utilities.
    j. Changes made by Change Order or Construction Change Directive.
    k. Changes made following Architect's written orders.
    l. Details not on the original Contract Drawings.
    m. Field records for variable and concealed conditions.
    n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Utilize personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.

6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up as-built prints with Architect. When authorized, submit marked-up to Architect. The Architect will then prepare a full set of corrected digital data files of the Contract Drawings, as follows:

1. Format: Annotated PDF electronic file.
2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
3. Refer instances of uncertainty to Architect for resolution.

C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Identification: As follows:

a. Project name.
b. Date.
c. Designation "PROJECT RECORD DRAWINGS."
d. Name of Architect.
e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
5. Note related Change Orders and record Drawings where applicable.

B. Format: Submit record Specifications as a paper copy as well as in scanned PDF electronic file(s) of marked up paper copy.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, record Specifications, and record Drawings where applicable.

B. Format: Submit record Product Data as a paper copy as well as scanned PDF electronic file(s) of marked up paper copy.

1. Include record Product Data directory organized by specification section number and title, electronically linked to each item of record Product Data.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and modifications to project record documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 01 78 39

SECTION 01 79 00 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.
3. Demonstration and training video recordings.

B. Related Sections:

1. Divisions 02 through 49 Sections for specific requirements for demonstration and training for products in those Sections.

1.3 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. Indicate proposed training modules utilizing manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

B. Qualification Data: For instructor.

C. Attendance Record: For each training module, submit list of participants and length of instruction time.

1.4 CLOSEOUT SUBMITTALS

A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module. Needs to match section on Final Completion.

1. Identification: On each copy, provide an applied label with the following information:

a. Name of Project.
b. Name and address of videographer.
c. Name of Architect.

d. Name of Contractor.
e. Date of video recording.

2. At completion of training, submit complete training manual(s) for Owner's use.

1.5 QUALITY ASSURANCE

A. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

1.6 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

a. System, subsystem, and equipment descriptions.
b. Performance and design criteria if Contractor is delegated design responsibility.
c. Operating standards.
d. Regulatory requirements.
e. Equipment function.
f. Operating characteristics.
g. Limiting conditions.
h. Performance curves.

2. Documentation: Review the following items in detail:

a. Emergency manuals.
b. Operations manuals.
c. Maintenance manuals.

d. Project record documents.
e. Identification systems.
f. Warranties and bonds.
g. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

a. Instructions on meaning of warnings, trouble indications, and error messages.
b. Instructions on stopping.
c. Shutdown instructions for each type of emergency.
d. Operating instructions for conditions outside of normal operating limits.
e. Sequences for electric or electronic systems.
f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:

a. Startup procedures.
b. Equipment or system break-in procedures.
c. Routine and normal operating instructions.
d. Regulation and control procedures.
e. Control sequences.
f. Safety procedures.
g. Instructions on stopping.
h. Normal shutdown instructions.
i. Operating procedures for emergencies.
j. Operating procedures for system, subsystem, or equipment failure.
k. Seasonal and weekend operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.

5. Adjustments: Include the following:

a. Alignments.
b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

a. Diagnostic instructions.
b. Test and inspection procedures.

7. Maintenance: Include the following:

a. Inspection procedures.
b. Types of cleaning agents to be used and methods of cleaning.
c. List of cleaning agents and methods of cleaning detrimental to product.
d. Procedures for routine cleaning
e. Procedures for preventive maintenance.
f. Procedures for routine maintenance.
g. Instruction on use of special tools.

8. Repairs: Include the following:

a. Diagnosis instructions.

b. Repair instructions.
c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
d. Instructions for identifying parts and components.
e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Division 01 Section "Operations and Maintenance Data."

B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
1. Owner will furnish an instructor to describe Owner's operational philosophy.
2. Owner will furnish Contractor with names and positions of participants.

B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner through Program Manager with at least 7 days advance notice.

C. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. General: Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

B. Video Recording Format: Provide high-quality color video recordings with menu navigation in format acceptable to Architect.

C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.

END OF SECTION 01 79 00

SECTION 01 91 00 – GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. The Owner will perform the Commissioning activities or has retained an independent Commissioning Authority (CxA) to coordinate Commissioning activities for this project. The objective of the Commissioning process is to verify and document that the performance of facilities, systems, and assemblies installed as part of this project meet the project's defined objectives and criteria.

B. This section outlines the general roles and responsibilities of the CxA, Owner, and General Contractor. Divisions 21, 22, 23, and 26 sections define roles and responsibilities applicable to Division 21, 22, 23, and 26 work.

C. The CxA is an independent contractor retained directly by the Owner and will coordinate all Commissioning activities with the Owner's representative.

D. Commissioning requires support from the contractors. The Commissioning Process does not relieve any contractor from their obligation to complete all portions of work in a satisfactory manner. Post contract/construction award, the Contractor shall not use any Commissioning responsibilities/obligations as justification for construction delays or requests for additional monies.

E. The General Contractor is responsible for coordinating all Commissioning activities with their Sub-Contractors.

1.2 RELATED SECTIONS

A. Division 22 Section 22 08 00 – Commissioning of Plumbing Systems

B. Division 23 Section 23 08 00 – Commissioning of HVAC Systems

C. Division 26 Section 26 08 00 – Commissioning of Electrical Systems

D. Individual Division 21, 22, 23, and 26 sections contain requirements related to the Commissioning process, if applicable for that Division.

1.3 DEFINITIONS

A. *Acceptance:* A formal action, taken by a person with appropriate authority (which may/may not be contractually defined) to declare that some aspect of the project meets defined requirements, thus permitting subsequent activities to proceed. The Owner's Representative shall be responsible for evaluating acceptable criteria.

B. *Commissioning Process or Commissioning (Cx):* A quality focused process for enhancing the delivery of a project. The process focuses on verifying and documenting that the facility and all of its systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the Owner's Requirements.

C. *Commissioning Process Activity:* A component of the Commissioning Process.

D. *Commissioning Authority (CxA):* An entity identified by the Owner who plans, schedules, and coordinates the Commissioning team to implement the Commissioning Process.

E. *Commissioning Field Report:* A written document that identifies the Commissioning activities completed during a visit to the project site. The report identifies significant findings, results, comments and questions that resulted from the visit. This is typically produced by the CxA per site visit.

F. *Commissioning Photo Log:* A log of photographs that support the items identified in the Commissioning Issues Log. The photo log numbering corresponds to the issue numbers listed in the Cx issues log.

G. *Commissioning Plan:* A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the Commissioning Process. The Cx Plan will be developed by the CxA.

H. *Commissioning Process Activities*: Components of the Commissioning Process.

I. *Commissioning Progress Report*: A written document that details activities completed as part of the Commissioning Process and significant findings from those activities, and is continuously updated during the course of a project.

J. *Commissioning Request for Information (RFI):* Form used by the Commissioning Authority to request information from the design or construction team.

K. *Commissioning Team:* The individuals and agencies who, through coordinated actions, are responsible for implementing the Commissioning Process. The Cx Team shall consist of: CxA, GC, MC, EC, TAB Contractor, Controls Contractor, Owner's Representative, A/E Representatives and equipment suppliers (as needed).

L. *Commissioning Testing*: The evaluation and documentation of the equipment, assemblies, any building/equipment controls, and systems delivery and condition, installation, proper function according to the manufacturer's specifications and project documentation to meet the design criteria.

M. *Construction Team:* The General Contractor, related sub-contractors, and other contractors working for the Owner during the Construction Phase.

N. *Construction Documents*: This includes a wide range of documents, which will vary from project to project, and with the Owner's needs and regulations, laws, and jurisdictional requirements. Construction documents usually include the project manual (specifications), plans (drawings), and general terms and conditions of the contract.

O. *Contract Documents*: This includes a wide range of documents, which will vary from project to project and with the owner's needs, regulations, laws, and jurisdictional requirements. Contract documents frequently include price agreements; construction management process; subcontractor agreements or requirements; requirements and procedures for submittals, changes, and other construction requirements; timeline for completion; and the construction documents.

P. *Commissioning Issues Log:* A formal document, created and maintained by the CxA, and ongoing record of problems or concerns identified through/during the construction phases which deviate from the project's construction documents, applicable codes and/or normal construction industry

practices and their resolution. Items on this issues log should be reviewed by the GC and corrected in a timely manner by the applicable trades and contractors.

Q. *Coordination Drawings:* Drawings showing the work of all trades to illustrate that equipment can be installed in the space allocated without compromising equipment function or access for maintenance and replacement. These drawings graphically illustrate and dimension manufacturers' recommended maintenance clearances.

R. *Design Review (Peer)*: An independent and objective technical review of the design of the project or a part thereof, conducted at specified stages of design completion by one or more qualified professionals, for the purpose of enhancing the quality of the design and to determine compliance with regulations, codes, or other standards administered by the Authority having Jurisdiction. The CxA may perform a Design Review during the early stages of design.

S. *Design Review (Commissioning)*: A review of the design documents to determine compliance with the Owner's Requirements and/or Basis of Design, including coordination between systems and assemblies being Commissioned, features and access for testing, Commissioning and maintenance, and other reviews required by the Owner.

T. *Facility Guide*: A basic building systems description and operating plan with general procedures and confirmed facility operating conditions, set points, schedules, and operating procedures for use by facility operations to properly operate the facility.

U. *Final Commissioning Report*: A document that records the activities and results of the Commissioning Process and is developed from the final Commissioning Plan with all of its attached appendices.

V. *Functional Performance Test (FPT):* A written protocol that defines methods, personnel, and expectations, for tests conducted on components, equipment, assembles, systems, and interfaces among systems. These documents shall be developed and provided by the CxA and shall require pre- approval by the Owner's Representative.

W. *Pre-Functional Checklist (PFC):* A form used by the installing contractors to verify that appropriate components are on-site, ready for installation, correctly installed, started up, tested and balanced, in compliance with the owner's project requirements, and is ready for Functional Performance Testing. These documents shall be developed and provided by the CxA and shall require pre-approval by the Owner's Representative.

X. *Submittal Review*: A Commissioning review of the equipment submittals for relevant mechanical, electrical, plumbing and energy consuming equipment and systems.

Y. *Test Procedure*: A written protocol that defines methods, personnel, and expectations for tests conducted on components, equipment, assemblies, systems, and interfaces among systems to verify compliance with the Owner's Project Requirements.

1.4 ROLES AND RESPONSIBILITIES

A. Commissioning Authority (CxA)
   1. Develop a Commissioning Plan outlining the organization, schedule, and documentation requirements of the Commissioning Process.
   2. Coordinate and direct the Commissioning activities in a logical, sequential and efficient manner using consistent protocols and forms, centralized documentation, clear and regular communications with the Cx team, and frequently update project timelines and schedules for Cx activities.

3. The CxA is not responsible for the design concept, design criteria, compliance with codes, site safety, construction means and methods, review or approval of change orders, design or general construction scheduling, cost estimating, or construction management.
4. Review contract documents for completeness and quality.
5. Perform focused reviews of the design, drawings and specifications at various stages of development (during schematic design, design development and contract document phases).
6. Develop full Commissioning specifications for all Commissioned equipment (Owner may provide the specifications). Coordinate them with, and integrate into, the specifications of the architect and engineers.
    a. The Commissioning specification will include:
        1) a detailed description of the responsibilities of all parties
        2) details of the Commissioning process
        3) reporting and documentation requirements, including formats
        4) alerts to coordination issues, deficiency resolution
        5) construction checklist and startup requirements
        6) subcontractors' Pre-Functional Checklists (PFC) Forms and responsibilities
        7) the Functional Performance Testing (FPT) Forms and process
        8) specific Functional Performance Test requirements, including testing conditions and acceptance criteria for each piece of equipment to be Commissioned
7. The CxA may assist with problem solving, non-conformance or deficiencies, but ultimately that responsibility resides with the General Contractor (GC) and the Architect/Engineer (A/E). The primary role of the CxA is to oversee the Commissioning process. This includes site observations of installation of Commissioned systems and equipment, development and coordination of the execution of a PFC and FPT testing plan and observation and documentation of performance that systems are functioning in accordance with the Owner's Requirements, design intent and in accordance with the Contract Documents. The Contractors will provide all tools and personnel to start, check-out and test equipment and systems, except as noted in this section.
8. Coordinate the Commissioning work and work with the GC to incorporate Commissioning activities into the master project schedule maintained by the GC.
9. Update and revise the Commissioning Plan as required.
10. Plan and conduct a Commissioning scoping meeting and other Commissioning meetings with the Cx team. The CxA will record meeting minutes for Cx meetings facilitated by the CxA and distribute them to all Cx Team members.
11. Request and review additional information required to perform Commissioning tasks, including installation, operations and maintenance (IOM) manuals and materials, contractor start-up and checkout procedures. Document results and incorporate into the Commissioning plan.
12. Review Contractor submittals applicable to systems being Commissioned, for compliance with the Owner's requirements and for coordination with the Commissioning Process. The CxA review provides information to the Design Team but is not a review for acceptance or rejection of the submitted equipment or system; acceptance or rejection of any submittal remains the responsibility of the Design Team.
13. Conduct periodic construction observations to verify that systems and equipment are installed consistently with Project's requirements. Document deficiencies and distribute to Cx Team members in a timely manner.
14. Attend selected planning and job-site meetings to obtain information on construction progress.
15. With necessary assistance and review from installing contractors, write and distribute the Pre-Functional Checklists and Functional Performance Test procedures for systems and equipment.
16. Approve Pre-Functional Checklists completed by GC by selected site observation visits and spot checking to confirm that systems and equipment are ready for Functional Performance Tests.

17. Review start-up and TAB reports to confirm included systems are ready for Functional Performance Testing.
18. Coordinate, witness and document Functional Performance Testing by installing contractors. Coordinate retesting as necessary until satisfactory performance is achieved per design specifications.
19. Coordinate, witness and document required seasonal or deferred Functional Performance Testing and any deficiency corrections required.
20. Review equipment warranties and confirm that they are project specific and clearly define the Owner's responsibilities if any.
21. Oversee and review the training of the Owner's operating personnel.
22. Review O&M manuals submitted by the GC.
23. Provide a final Commissioning report for review and acceptance by the Owner's Representative.
24. The CxA is not responsible for construction means and methods or for site safety and security.
25. The CxA will not authorize or approve construction cost amendments, changes to the construction schedule, or changes to the contract documents.
26. Participate in the TAB Field verification process using a sampling method. Document the verification using TAB FPTs.

B. General Contractor (GC) and Sub-Contractors
1. The GC is responsible for coordinating all Commissioning activities of the sub-contractors. Commissioning activities may be completed by the Mechanical Contractor (MC), Electrical Contractor (EC), Controls Contractor (CC), or Test and Balance (TAB) contractor, but the GC is ultimately responsible for completion of all Cx related tasks.
2. Facilitate the coordination of the Commissioning work by the CxA and incorporate Commissioning activities into the master schedule.
3. Furnish a copy of all construction documents, addenda, change orders, Requests for Information (RFIs), approved submittals, shop drawings, Architect's Supplemental Instructions (ASIs), and IOMs, related to Commissioned systems and equipment to the CxA.
4. In each purchase order or written subcontract, include any requirements for Commissioning.
5. Ensure that all sub-contractors execute their Commissioning responsibilities according to the Contract Documents, responsibilities and schedule.
6. The GC shall designate a staff member who will be knowledgeable and responsible for the construction of the Commissioned systems (typically the site superintendent) to be their active representative on the Commissioning team. This person shall attend the Commissioning scoping meeting and other necessary meetings scheduled by the CxA to facilitate the Commissioning process.
7. Each sub-contractor shall designate a staff member who will be knowledgeable and responsible for the construction of the Commissioned systems (typically the trade superintendent) to be their active representative on the Commissioning team. This person shall attend the Commissioning scoping meeting and other necessary meetings scheduled by the CxA to facilitate the Commissioning process.
8. Coordinate and share the issues identified on the Cx Issues Log with the appropriate trade sub-contractors. Respond in writing to the CxA and Owner's Representative with the contractor's response, appropriate trade responsible for the corrective action and anticipated completion date for the corrective action.
9. Follow up with the subcontractors as to the status of the corrective actions to the items on the Cx Issues Log, and update the CxA.
10. The GC's designated Cx team staff member shall personally examine, witness and verify that all issues are corrected and complete when the sub-contractor states they have "corrected" an item on the Cx Issues Log.
11. Notify the CxA one week in advance of all equipment start-ups and tests required by the Contract Documents.

12. Submit test results for tests required by the Contract Documents, including (but not limited to) duct leakage tests, hydronic system pressure tests, generator tests, etc. as applicable to the Commissioning scope.
13. Receive the Pre-Functional Checklist forms from the CxA. Create a "master" Pre-Functional Checklist document binder containing all checklists for the project that shall remain at the project site.
14. Coordinate and distribute copies of the Pre-Functional Checklists to all relevant subcontractors.
15. Notify the CxA when Pre-Functional Checklists are completed.
16. Remedy any deficiencies identified in the Pre-Functional Checklists and notify the CxA (in writing) that deficiencies have been addressed.
17. Notify the CxA when TAB activities will be taking place and have been completed. Provide the CxA with TAB report(s).
18. Participate in TAB verification, which may include repeating selected measurements contained in the TAB report(s).
19. Coordinate with subcontractors to ensure qualified technicians are available for performing the Functional Performance Test procedures under direction of the CxA.
20. Coordinate the training of Owner personnel.
21. Verify that subcontractors prepare and submit O&M manuals, according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions.
22. Ensure that subcontractors execute seasonal or deferred Functional Performance Testing, witnessed by the CxA, according to the specifications.
23. Ensure that subcontractors correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.
24. Gather and submit all project closeout documentation, including submittals, O&M manuals, as-built drawings, warranties, etc. to CxA for review.

C. Owner
1. Arrange for facility operating and maintenance personnel to attend various field Commissioning activities and field training sessions according to the Commissioning (Cx) Plan.
2. Provide final approval for the completion of the Commissioning requirements.
3. Coordinate site visits and meetings with the CxA.
4. Review and comment on Commissioning documentation such as the Cx plan, field reports, PFC & FPT Forms, and Cx Issue Logs.
5. Provide interpretations and clarifications of the Owner’s Requirements.
6. Provide input and direction on Commissioning-related recommendations that arise from the Commissioning process which may enhance the operation of the building but are not included in the project documents and may be an additional project cost. If the Owner is in agreement with Commissioning recommendations, they are to direct the Design Team to review and issue the appropriate directive to add that scope and maintain the Design Team's responsibility for all construction documents.

D. Design Team (Architect/Engineer)
1. Perform normal submittal review, construction observation, as-built drawing preparation, O&M manual preparation, etc., as contracted with Owner.
2. Fulfill all obligations specified in the contract documents, including reviewing and approving submittals, conducting construction observation, issuing addenda and clarifications, responding to RFIs, issuing punchlists, and conducting substantial and final completion walkthroughs. Review and provide comments on all recommendations.
3. Provide any design narrative documentation requested by the CxA.
4. Prepare and submit final as-built design intent documentation for inclusion in the Systems Manual.
5. Review and approve the O&M manuals.

6. Coordinate resolution of design non-conformance and design deficiencies identified during the project.
7. Assist (along with the contractors) in clarifying the operation and control of Commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.
8. Participate in the resolution of system deficiencies identified during Commissioning.
9. Notify the CxA of substantive changes to the Contract Documents.
10. Provide clarifications to Contract Documents as required.
11. Review the Design Team Commissioning Issues Log and respond to all items in a timely manner. Update contract documents as required to address Commissioning items identified.
12. Review Commissioning suggestions identified on the Design Team Commissioning Issues Log for impact to the design intent. If the design team is in agreement with the suggestion, they are to assist in reviewing the suggestion with the owner for their review and decision if it should be added to the project.
13. The design team shall review all shop drawing and submittal comments from the CxA.

1.5 SCOPE OF WORK

A. Refer to Section 21 08 00 for listing of fire suppression systems to be Commissioned and requirements.

B. Refer to Section 22 08 00 for listing of plumbing systems to be Commissioned and requirements.

C. Refer to Section 23 08 00 for listing of HVAC systems to be Commissioned and requirements.

D. Refer to Section 26 08 00 for listing of Electrical Systems to be Commissioned and requirements.

1.6 COMMISSIONING DOCUMENTATION

A. General
1. Timely and accurate documentation of Commissioning activities is essential for the Commissioning process to be effective. To this end, all Commissioning activities conducted by the contractors shall be documented as outlined below and in Part 3 Execution of this specification.
2. Contractor Commissioning responsibilities on Project Management Software include the following items:
    a. Commissioning Schedule
    b. Construction Issues
    c. Pre-Functional Checklists
    d. Functional Performance Test Forms
3. The Architect, Engineers, GC, subcontractors, and owner will be responsible for responding within five business days of an inquiry being assigned to them.
    a. The owner(s) or their designated responsible party will be one of the final designated personnel in the approval process that will sign off before an item can be closed out.
    b. All of the aforementioned entities will be responsible for the same response time in the identified field punch software.
    c. The punch list and open Commissioning items will be tied to identified retention dollars that will not be paid until all open issues are resolved.
    d. Owner-Insite will be the designated software that will be used by all Cx agents and used for MEP items identified by the Cx agent and Owner.
4. The Pre-Functional Checklists shall be completed by each respective trade contractor involved with the installation of any Commissioned systems and equipment.

5. The Functional Performance Tests will be completed by the CxA as they witness the test(s) conducted by the contractors.
6. All Contractor Commissioning Documents prepared by the contractors will be fully completed in a neat and workmanlike manner so as to be fully legible. Documentation which, at the CxA's discretion, is incomplete or less than fully legible shall be deemed unacceptable.
7. Commissioning procedures and tests, which are rejected by the CxA due to incomplete, or illegible contractor documentation shall be repeated by the contractor and new Contractor Commissioning Documents shall be prepared to the Commissioning Team's satisfaction at no additional cost to the Owner.
8. Procedures deemed unacceptable by the Commissioning Team after being repeated due to inadequate documentation may be subject to completion by the CxA, at a cost to the contactor as outlined in item Section 3.8 "Cost of Re-Evaluation" below.
9. All Contractor Commissioning Documents shall be completed on the job-site concurrent with the activities being documented. Remedial documentation of Commissioning activities either off-site or after the procedures have been completed is unacceptable.
10. All Contractor Commissioning Documents will be submitted to the CxA for review and acceptance upon completion.

B. Contractor Commissioning Process Status Tracking
1. Contractors shall be responsible for monitoring the progress of their Commissioning activities. The contractor will update the status of meetings, issues, re-scheduling, checklists and tests.
2. The contractors shall regularly update and upload drawings or pictures as Commissioning activities are completed so as to provide a readily available report to CxA regarding current status of the contractors Commissioning activities.

C. Record Drawings
1. Contractors shall regularly update a 'redlined' set of record drawings showing Commissioned systems as work is being installed so that the drawings remain current with the field work, and as required in Division 01, 21, 22, 23, and 26 of the project specifications.
2. Redlining record drawings at the end of construction shall not be acceptable.
3. The Contractors up-to-date, in-progress redlines shall be kept on-site in the Contractor's field office and available for review by the Cx Team.

D. Access to Contractor Documentation
1. Contractors shall provide the CxA with access to shop drawings, coordination drawings, equipment cut-sheets, schematics, in-progress record drawings, manufacturers installation-operation-maintenance manuals, startup reports, etc. to assist the CxA in execution of the Cx process.

1.7 COORDINATION

A. The CxA shall receive a copy of all construction documents, project schedules, addenda, change orders, and appropriate approved submittals and shop drawings directly from the GC.

B. The CxA shall disseminate written information and documents to all responsible parties relative to the nature and extent of the Cx communication.

C. The CxA is primarily responsible to the Owner and, as such, shall regularly apprise the GC and the Owner of progress, pending problems and/or disputes, and shall provide regular status reports on progress with each system. Any potential change in the contractual and/or financial obligations of the owner (credits, change orders, schedule changes, etc.) shall be identified and quantified as soon as possible.

D. The CxA shall coordinate the schedule of Commissioning activities with the construction schedule. It is possible that some procedures will be completed before the entire system is completed.

1.8 SCHEDULE

A. Commissioning of systems shall proceed per the criteria established in the specific sections that follow, with activities to be performed on a timely basis. The CxA shall be available to respond promptly to avoid construction delays.

B. Start-up and testing of systems may proceed prior to final completion of systems to expedite progress. However, testing and checkout services that are the primary responsibility of the contractor / vendor will not proceed in advance of their testing and checkout.

C. Problems observed shall be addressed immediately, responsible parties notified, and actions to correct deficiencies coordinated in a timely manner.

D. Contractor schedules and scheduling is the responsibility of the GC. The CxA shall provide Commissioning scheduling information to the GC for review and planning activities.

1.9 REFERENCE STANDARDS

A. Industry standards and guidelines are a guide to the Commissioning process and are hereby incorporated and will be applied as appropriate. Reference standards and guidelines include, but are not limited, to the following:

B. References:
1. ASHRAE Standard 202-2013: Commissioning Process for Buildings and Systems
2. ASHRAE Guideline 0-2005: The Commissioning Process
3. ASHRAE Guideline 1.1-2007: HVAC&R Technical Requirements for The Commissioning Process
4. ACG Commissioning Guideline (current version)
5. NEBB Commissioning Standard (current version)
6. BCxA Building Commissioning Handbook (current version)

2.0 SUBSTANTIAL COMPLETION

A. “Certificate of Substantial Completion” will not be signed by the Dallas ISD unless the CxA and the Owner’s Representative are in agreement that all Equipment and Systems to be Commissioned are installed and operational, and any open Cx Issues Log items have been identified as minor. Any open Cx Issues Log items shall be resolvable within 21 days.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

A. All industry standard test equipment required for performing the specified tests shall be provided by the applicable contractor (as specified) and shall be approved by the CxA. Any necessary proprietary vendor specific test equipment shall be provided by that vendor or manufacturer.

B. Any portable or hand-held setup / calibration devices required to initialize the control system shall be made available by the control vendor to the CxA (at no additional cost to the Owner or CxA).

C. The instrumentation used in the Commissioning process shall meet the following standards:
   1. Be of sufficient quality and accuracy to test and/or measure system performance within the tolerances required.
   2. Be calibrated at the manufacturer's recommended intervals (typically within the previous 12 months) with calibration tags permanently affixed to the instrument
   3. Be maintained in good repair and operating condition throughout the duration of use on this project.
   4. Be immediately re-calibrated or repaired if dropped and/or damaged in any way during use on this project.

PART 3 - EXECUTION

3.1 COMMISSIONING PLAN AND SCHEDULE

A. The CxA shall generate a project specific Commissioning plan which identifies Cx tasks, roles and responsibilities for the Cx process. The CxA will submit a Cx schedule for the Commissioning process which shall be integrated into the construction schedule by the GC.

3.2 CONSTRUCTION OBSERVATION

A. This is an additional and separate activity from that provided by the design team. Construction observation is required as part of the Commissioning and coordination process to be provided by the CxA. Field Observation reports will be maintained and distributed by the CxA to all Cx Team members.

3.3 COMMISSIONING ISSUES LOGS

A. As part of the Commissioning process, all issues will be recorded on the Project Management Software. The PM Software will divide the issues as follows.

   1. Construction Commissioning Issues
      a. This log is also a part of the Web-Based Project Management Software. It is a formal and ongoing record of problems or concerns pertaining to the installation of the Commissioned systems and equipment which identifies where the contractors have deviated from the OPR, contract documents, applicable codes or normal industry construction practices. It is the GC's responsibility to regularly login and retrieve this log from the Web-Based Project Management Software, follow up and review each item on the list with the appropriate trades, and respond to the CxA with feedback within 5 business days from the issuance of the log from the CxA.
      b. Team members will be given access through the Web Based Project Management Software to comment on issues. This is where the GC should provide feedback which includes the following sections:
         1) Response/Action: This is the contractor's response to the issue identified by the CxA.
         2) Trade: This identifies the specific contractor responsible for the correction of the issue. The issue will be assigned to that contractor or subcontractor.
         3) Expected Completion Date: This is the date which the GC and subcontractor agree the issue will be resolved by. This provides information back to the CxA

as to when items should be corrected by for spot checking the correction of issues.

c. The GC shall provide feedback and updates to the construction Cx issues log to the CxA within 5 business days from its issuance from the CxA.

d. The CxA will maintain the master cx long on the Web Based Project Management Software.

3.4 PRE-FUNCTIONAL CHECKLISTS

A. The Commissioning Authority shall develop the Pre-Functional Checklists (PFCs) and distribute them to the GC for use by the sub-contractors.

B. The sub-contractors shall complete the checklists and submit them to the GC as they are completed or uploaded to the Web Based Project Management Software.

C. PFCs consist of a series of field observations and verification checks conducted by the contractors during the installation of Commissioned equipment to verify the following:
1. Installed equipment matches the specifications and approved submittals
2. Equipment is installed per the specifications, drawings and manufacturer's recommendations.
3. Utility connections to equipment, such as electrical, steam, chilled water, etc. have been successfully completed.
4. Equipment is ready for start-up per manufacturer's guidelines.

D. Contractors should expect to complete one (1) PFC for each piece of equipment covered by the Commissioning process such as pumps, fans, air handling units, terminal units, control panels, and lighting control panels.

E. PFCs for mechanical equipment will include verification of the safety devices intended to stop and/or prevent equipment operation unless minimum safety standards or conditions are met. These may include adequate oil pressure, proof-of-flow, non-freezing conditions, maximum static pressure, maximum head pressure, etc. The CxA shall observe the actual performance of safety shutoffs in a real or closely simulated condition of failure.

F. Systems may include safety devices and components that control a variety of equipment operating as a system. Interlocks may be hard-wired or operate from software. Operation of these interlocks shall be verified by the CxA.

G. Additional checklists will be required to verify installation of distribution systems such as piping, ductwork, electrical wire and conduit, etc. The number of required PFCs will vary from system to system, but will typically be limited to one form per system per floor or zone.

H. The PFC used for this project will be finalized by the CxA after receipt of equipment Installation, Operation & Maintenance (IOM) Manuals from the Contractors.

I. PFCs shall be completed by the contractor and maintained on-site per the requirements of this specification, Section 1.6 "Commissioning Documentation".

3.5 CONTRACTOR STARTUP TESTING

A. The contractors shall conduct all startup testing as required by the specifications, equipment manufacturer, the manufacturer's installation, operations and maintenance manual or as necessary to verify all equipment is properly installed and fully operational.

B. Startup testing shall be documented. Appropriate documentation shall be by the contractor and/or the manufacturer's representative or entity specified in the construction documents.

C. The startup testing shall be documented using the contractors or manufacturer's standard forms and an electronic copy of the form shall be provided to the CxA or uploaded to the Web Based Project Management Software under the appropriate PFC.

3.6 TESTING AND BALANCING

A. Testing, Adjusting, and Balance Contractor (TAB) Requirements
   1. Air and water balance shall be accomplished by an independent test and balance firm. The test and balance firm shall come back after the final balancing report is approved to work with the CxA and spot check this work to verify accuracy of results. Refer to Division 23 for acceptance criteria.
   2. Test and Balance contractor to provide the final balancing report to the CxA.
   3. The TAB contractor shall be responsible for successful completion and documentation of all TAB activities specified in the Division 23.
   4. Prior to the start of TAB activities, the TAB contractor shall submit a proposed TAB plan, procedures and documentation to the CxA and A/E for review. TAB procedures shall be submitted to allow sufficient time for CxA review and approval prior to the start of TAB activities.
   5. After this review, and prior to start of field work, the TAB contractor will attend one or more planning meetings as required with the Commissioning Team to review and discuss outstanding issues relating to TAB procedures and forms, discuss resolution of issues identified during the TAB contractor’s plan review and field inspections, and to coordinate field work.
   6. Prior to the start of fieldwork, the TAB contractor shall issue a final set of TAB procedures and TAB forms which incorporate any comments received during the Commissioning Team review.
   7. The TAB contractor shall have at least one certified field technician on site whenever TAB work is being performed. The certified technician shall be responsible for the quality of the work of any non-certified technicians.
   8. The TAB contractor is responsible to notify the GC, who in turn shall notify the Commissioning Team, a minimum of two (2) weeks in advance of the time for start of TAB work to allow the CxA and A/E time to assess system readiness.
   9. The TAB contractor will work cooperatively with the CxA.
   10. The TAB contractor shall coordinate with the controls contractor to ensure that changes made to the control system during TAB (flow coefficients, duct areas, etc.) are archived and become the default or initial values for these parameters.
   11. The TAB contractor shall provide daily lists of issues and/or problems identified during TAB work to the GC, CxA and A/E for follow-up & resolution with the appropriate contractors.
   12. Participate in verification of the TAB report, which will consist of repeating any selected measurement contained in the TAB report where required by the CxA for verification or diagnostic purposes.
   13. A TAB Final Acceptance Inspection shall be conducted by the A/E, Owner’s Representative and CxA and will include a field verification of at least 5% of the TAB contractor’s field readings.
   14. The TAB contractor will provide technicians, equipment and instrumentation to support the field verification.
   15. Instruments used for the field verification shall be the same instruments (by model and serial number) that were used for the original TAB work.

16. The TAB Contractor shall provide test equipment calibration certifications to the Owner's Representative or the CxA upon request.

3.7 FUNCTIONAL PERFORMANCE TEST PROCEDURES

A. Scope
1. Functional Performance Test (FPT) procedures are executed after Commissioned equipment and systems have been installed, started-up, balanced and are fully operational. The goal of these procedures is to conclusively verify that Commissioned equipment, sub-systems and major systems operate and perform per the design intent, and the project specifications.
2. Equipment-level FPTs will be used to verify operation and capacity of selected equipment such as boilers, chillers cooling towers, pumps, exhaust fans, air handling units, etc.
3. System-level FPTs will verify the following aspects of system operation.
   a. System operation under both normal and alternate operating conditions and modes.
   b. Interactions between equipment and sub-systems.
   c. Operation of safeties and interlocks.
   d. Control system operation, response time, stability and tuning.
   e. System response to abnormal and/or emergency conditions such as fire, equipment failure and power outages, and associated Alarms.
   f. All control sequence of operation strategies, alarm generation and reporting shall also be reviewed and proper operation verified by the CxA.
   g. The central work station graphics, point assignments, alarm messages, and logging functions shall be verified.

B. Functional Performance Test Forms
1. The FPTs used for this project will be created, utilized and finalized by the CxA after receipt of approved contractor submittals.

C. Contractor Requirements
1. The Cx team will, in a joint effort, coordinate and schedule FPT activities.
2. Scheduling of FPTs shall be contingent on notification from the affected contractor(s) to the GC and CxA that equipment and systems are ready for checkout.
3. Other prerequisites for execution of FPTs shall include the following:
   a. All Contractor Startup Procedures and Cx Pre-Functional Checklists have been completed and documented.
   b. TAB has been completed.
   c. All Cx Issues Log items identified as affecting equipment or system performance or operations have been resolved.
4. Prior to claiming readiness for FPT, the Controls Contractor shall ensure that the following items are completed and documented:
   a. Point-to-point checkouts have been verified and documentation has been submitted to the CxA.
   b. Verify that network communication between all devices and systems is established
   c. Sequence of Operation checkouts are completed.
   d. Printed and annotated trend logs and alarm histories establishing acceptable operation including
      1) Stable control
      2) Recovery from upset/changes (e.g., from setback)
      3) Special and/or seasonal modes
      4) Emergency and alarm modes including loss/restoration of power
5. Execution of the FPTs will be conducted by the contractors providing and installing the equipment and systems being Commissioned and shall be witnessed by the CxA. The Controls Contractor shall verify/validate the BAS Sequences of Operations to the satisfaction of the CxA.

6. Typical activities during FPT execution will include the following:
    a. Starting/stopping equipment
    b. Energizing/de-energizing electrical distribution gear
    c. Opening/closing valves and dampers
    d. Manipulating BAS inputs, outputs and set points
    e. Setup, collection and downloading of BAS trend data
    f. Test all modes of operation (normal, failure, backup, emergency, etc.)
    g. Confirmation of required alarms sent to BA
    h. Written verification of equipment set-points (temperatures, flow rates, etc.)
7. The Contractor(s) shall maintain full responsibility for the facility, equipment and systems operated during the FPTs, maintain all guarantees and warranties, and shall repair any damage to the facility caused during the FPTs.
8. Contractors shall conduct seasonal FPTs as necessary. This includes performing FPTs on equipment during the season it is intended to operate (i.e. test cooling equipment during the peak cooling season and test heating equipment during the peak heating season, etc.). All seasonal FPTs shall be witnessed by the CxA.
9. Tools, test equipment and instrumentation required for completion of the FPTs shall be provided by the contractor. All instruments shall meet the requirements of Part 2 of this specification.
10. FPT acceptance shall confirm the performance of systems to the extent of the design intent. When a system is accepted, the Owner shall be assured that the system is complete, works as intended, is correctly documented, and operator training has been performed.

3.8 COST OF RE-EVALUATION

A. The cost for Contractors to re-evaluate any Commissioning Procedures due to open issues shall be bore by the contractors.

B. The CxA will be available for two attempts of the Functional Performance Tests (one initial and one re-try) with minimal follow-up where necessary (due to deficiencies, systems not ready, incomplete work, etc.) to try to accomplish each test as part of the contract. When additional work is required because systems are not ready or because they do not successfully pass the FPT after they have been indicated as ready, the contractor will be charged for the CxA's additional reasonable re-testing costs. Additional fees will be paid to the CxA by the Owner and shall be reimbursed by the Contractor.

C. Any required re-testing by any contractor shall not be allowed as a justified reason for a claim of delay or for a time extension by the contractor or for a request for additional monies.

3.9 SOFTWARE DOCUMENTATION REVIEW

A. Review detailed software documentation for all DDC control systems. This includes review of vendor documentation, their programming approach, and the specific software routines applied to this project. Discrepancies in programming approaches and/or sequences shall be reported and coordinated in order to provide the Owner with the most appropriate, simple, and straightforward approach to software routines.

3.10 OPERATING AND MAINTENANCE (O&M) MANUALS

A. The CxA shall review the draft form of the O&M manuals provided by the Division 21, 22, 23, and 26 contractors. The review process shall verify that O&M instructions meet specifications and are included for all equipment furnished by the contractor, and that the instructions and wiring

diagrams are project specific (edited where necessary) to the actual equipment provided for this project.

1. Published literature shall be specifically oriented to the provided equipment indicating required operation and maintenance procedures, parts lists, assembly/disassembly diagrams, and related information.
2. The contractor shall incorporate the standard technical literature into system specific formats for this facility as designed and as actually installed. The resulting O&M information shall be project and system specific, concise, to the point, and tailored specifically to this facility. The Commissioning Authority shall review and edit these documents as necessary for final corrections by the contractor.

B. The O&M manual review, and coordination efforts MUST be completed prior to Owner training sessions, as these documents are to be utilized in the training sessions.

C. In addition to the O&M manual requirements within specification Division 21, 22, 23, and 26, O&M manuals shall include at a minimum the following:

1. An equipment data sheet with the equipment name tag, model number, serial number and any other relevant information for the equipment.
2. A copy of the approved submittal, indicating the exact make and model of the equipment installed.
3. A copy of the manufacturer's IOM manual
4. A copy of all warranty's
    a. If not included on warranty certificate, provide the start/end dates of warranty period, descriptions of what is and isn’t covered and contact information for warranty claims.

3.11 RECORD DRAWINGS

A. The Commissioning Authority shall review the as-built contract documents to verify incorporation of both design changes and as-built construction details. Discrepancies noted shall be corrected by the appropriate party.

3.12 EXCLUSIONS

A. Responsibility for construction means and methods: The CxA is not responsible for construction means, methods, job safety, or any construction management functions on the job site.

B. Hands-on work by the CxA: The contractors shall provide all services requiring tools or the use of tools to start-up, test, adjust, or otherwise bring equipment and systems into a fully operational state. The CxA shall coordinate and observe these procedures (and may make minor adjustments), but shall not perform construction or technician services other than verification of testing, adjusting, balancing, and control functions.

END OF SECTION 01 91 00

DALLAS INDEPENDENT SCHOOL DISTRICT
DAVID W. CARTER HIGH SCHOOL
HAZARDOUS MATERIAL REPOERT

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PRE-RENOVATION ASBESTOS INSPECTION

David W. Carter High School (Project Site)
1819 W. Wheatland Road, Dallas, TX

PREPARED FOR:
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Owner's Representative
Dallas ISD | Dikita Bond Program Management
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PREPARED BY:
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DATE: 7 January 2025

Inspected by: Thomas A. Hale (TDSHS AI 602545)

Prepared by: Thomas A. Hale (TDSHS AI 602545)

Reviewed by: Edward B. Barganier (TDSHS AIC 105519)

Executive Summary

LCA Environmental, Inc. (LCA) has completed a pre-renovation asbestos inspection of the David W. Carter High School (Carter and Project Site) located at 1819 W. Wheatland Road in Dallas, Texas. The inspection was performed to comply with U.S. EPA regulations 40 CFR 61, Subpart M - National Emissions Standard for Hazardous Air Pollutants (NESHAP) and the Texas Asbestos Health Protection Rules (TAHPR) which require that, prior to any construction, renovation, or demolition, the area where the work is to be performed shall be inspected by a properly trained and licensed individual for the presence of asbestos-containing building materials (ACBM) that may be disturbed during the work. This inspection was not intended to fully comply with the Asbestos Hazard Emergency Response Act (AHERA), 40 CFR 763. However, the results of this inspection are intended to be integrated into the existing AHERA documentation for the Project Site. This work has been performed for Dallas Independent School District (Client). This inspection scope of work was limited to accessible building materials which would be impacted by planned renovations based on information provided by Client prior to the site visit which included Construction Documents by PBK Architects dated 12 August 2024.

Project Site Observations

LCA was provided with the above-mentioned Construction Documents. LCA was in possession of a 2017 pre-renovation inspection report and a 2020 post abatement report, both produced by LCA. LCA's pre-renovation asbestos inspection was based upon a review of the provided information. Previously un-sampled materials were inspected and sampled in accordance with AHERA and TAHPR.

Documents provided by the Client and reviewed by LCA included:

- Pre-Renovation Inspection for Asbestos-Containing Building Materials (ACBM) Report by LCA (Project 170819) dated 29 November 2017
- Post Abatement Report by LCA (Project 180315) dated 29 September 2020
- Construction Documents by PBK Architects dated 12 August 2024

On 12 and 14 November 2024, LCA's EPA accredited and Texas Department of State Health Services (TDSHS)-licensed Asbestos Inspector, conducted the asbestos inspection.

Please refer to the attached Figure(s) for further detail as to the location and extent of observed and/or sampled materials.

Conclusions

LCA collected a total of 104 samples, which were analyzed by Moody Labs, LLC., an accredited analytical laboratory under the National Voluntary Laboratory Accreditation Program (NVLAP) and licensed by TDSHS. Suspect materials sampled and analyzed for asbestos content included:

SUMMARY OF SAMPLED BUILDING MATERIALS	
6 samples of lay-in ceiling panel	11 samples of plaster ceiling
9 samples of plaster walls	6 samples of concrete wall with texture
3 samples of ceramic tile wall	3 samples of drywall wall system
9 samples of vinyl cove base	3 samples of ceramic cove base
6 samples of carpet square mastic	24 samples of vinyl floor tile
3 samples of vinyl stair cap	3 samples of concrete stair
3 samples of stage curtain	6 samples of button mastic
3 samples of exterior brick and mortar	3 samples of exterior concrete canopy
3 samples of exterior concrete	

Below is a table of materials identified as ACBM during this inspection:

SUMMARY OF MATERIALS NEWLY IDENTIFIED TO BE ACBM						
HA DESIGNATION	**IDENTIFIED ACBM**	**ACBM TYPE & CONDITION**			**FRIABLE / NON-FRIABLE**	**APPROXIMATE QUANTITY of ACBM AND LOCATIONS**
		TYPE	**DC**	**PD**		
5	Plaster with texture (smooth)	S	ND	PD	NF	60 ft^2 Hallway C14.2
11	Black mastic assoc. with 4" cove base (gray)	Misc.	ND	PD	NF	235 ft^2 Auditorium first floor and balcony
29	Plaster wall (crow's foot)	S	ND	PD	NF	80 ft^2 Hallway C14
30	Mortar assoc. with ceramic cove base (tan)	Misc.	ND	PD	NF	5 ft^2 Hallway C14

Due to the non-destructive methods utilized during this inspection, one material to be impacted by planned renovations was presumed to be asbestos-containing (PACM). Below is a table of materials identified as PACM during this inspection:

SUMMARY OF MATERIALS NEWLY IDENTIFIED TO BE PACM						
HA DESIGNATION	**IDENTIFIED PACM**	**PACM TYPE & CONDITION**			**FRIABLE / NON-FRIABLE**	**APPROXIMATE QUANTITY of ACBM AND LOCATIONS**
		TYPE	**DC**	**PD**		
N/A	Polyurethane flooring	Misc.	ND	PD	NF	1,225 ft^2 Dance room

SUMMARY OF MATERIALS PREVIOUSLY IDENTIFIED TO BE ACBM					
IDENTIFIED ACBM	**ACBM TYPE & CONDITION**			**FRIABLE/ NON-FRIABLE**	**APPROXIMATE QUANTITY of ACBM AND LOCATIONS**
	TYPE	**DC**	**PD**		
Spray-applied fire proofing	S	D	PD	F	10,768 ft^2 Space above Auditorium ceiling

ACBM Type
S - Surfacing
TSI - Thermal System Insulation
Misc. - Miscellaneous
F – Friable
NF – Non-friable

DC (Damage Condition)
ND - No Damage
D – Damage
SD - Significant Damage

PD (Potential Damage)
LPD – Limited Potential for Damage
PD – Potential for Damage
PSD – Potential for Significant Damage

See attached Figure 1 for further details regarding sample locations.

See the aforementioned previous inspection reports as well as existing AHERA documentation for information regarding other building materials present at the Project Site.

Limitations

The findings and opinions of this asbestos inspection are not scientific certainties, but rather opinions based on our professional judgment concerning the significance of the data gathered during the course of the re-inspection. LCA does not represent that the Project Site contains no hazardous or toxic materials, wastes, or other latent conditions beyond the observations made by LCA during the Project Site inspection.

LCA is not responsible for any omissions or inaccuracies of any sort that arise as a result of the Client's failure or inability to provide Project Site information or data. LCA makes no warranties or representations, expressed or implied, beyond those expressed in the Master Contract for Services and this report.

LCA performed a pre-renovation asbestos inspection of the Project Site and only those ACBM that are specifically discussed in this document were identified or addressed during this project. It is possible that other ACBM may exist at the Project Site in areas that were not seen, were concealed, were otherwise inaccessible (e.g., behind walls, above ceilings, inside old air ducts, etc.) or were not included in this scope of work. Building materials such as metal, plastic, glass, rubber and paint were not sampled. The identification or addressing of other potential asbestos-containing materials was outside the scope of service of this contract. LCA assumes no responsibility or liability for any asbestos-containing building materials at the facility.

LCA's inspection was limited to accessible building materials that were previously identified as PACM. LCA's inspection was not comprehensive or destructive. LCA recommends that, prior to future demolition and/or renovations at the Project Site, final renovation plans, this report, and the AHERA documentation for the Project Site be carefully reviewed and any building materials that have not been inspected by a TDSHS-licensed Asbestos Inspector be sampled in accordance with the AHERA and the TAHPR prior to their disturbance.

This pre-renovation asbestos inspection report has been prepared for the exclusive use of GCISD and its direct representatives and associates, to assist with their efforts to identify asbestos-containing building materials connected with the Project Site. LCA does not authorize the use of this report for any purpose other than that for which it is prepared.

Attachments: Table 1 – Identified Non-ACBM Materials
Figures 1 - 3 – Sample Location Plans
Figures 4 - 5 – ACBM Location Plans
Photographic Documentation
Laboratory Analysis Reports 24B-13598
LCA Licenses and Certifications

241015 1/7/2025

SUMMARY OF NON-ASBESTOS-CONTAINING BUILDING MATERIALS

Facility: David W. Carter High School
Area: Black Box addition Renovation Areas
Address: 1819 W. Wheatland Road
Dallas, Texas

Sample Numbers	HA#	Material Description of Homogeneous Area	General Location
1, 2, 3	1	2' x 2' Lay-in Ceiling Panel (Pinhole)	Dance Room, Hallways C14, C14.1 and C14.2
4, 5, 6	2	2' x 2' Lay-in Ceiling Panel (Chicken Scratch)	Dance Room, Hallways C14, C14.1 and C14.2
7, 8, 9	3	Concrete Wall with Texture (Orange Peel)	Hallway C14.1
10, 11, 12	4	Concrete Wall with Texture (Sandy)	Hallway C14.2
16, 17, 18	6	12" x 12" Vinyl Floor Tile (Red) with Mastic (Yellow)	Hallways C14, C14.1 and C14.2
19, 20, 21	7	12" x 12" Vinyl Floor Tile (Blue) with Mastic (Yellow)	Hallways C14, C14.1 and C14.2
22, 23, 24	8	12" x 12" Vinyl Floor Tile (White w/Flecks) with Mastic (Yellow)	Hallways C14, C14.1 and C14.2
25, 26, 27	9	12" x 12" Vinyl Floor Tile (Tan w/Flecks) with Mastic (Yellow)	Hallways C14, C14.1 and C14.2
28, 29, 30	10	2nd Layer Vinyl Floor Tile with Mastic (Yellow)	Hallways C14, C14.1 and C14.2
34, 35, 36	12	Concrete Stair	Auditorium
37, 38, 39	13	Carpet Square Mastic (Yellow)	Auditorium First Floor
40, 41, 42	14	Stage Curtain	Auditorium First Floor
43, 44, 45	15	Vinyl Stair Cap	Auditorium First Floor
46, 47, 48	16	12" x 24" Ceramic Tile Wall System	Main Hallways
49, 50, 51, 52, 53	17	Plaster Ceiling (Sandy)	Auditorium
54, 55, 56	18	Carpet Square Mastic (Clear)	Auditorium Balcony
57, 58, 59	19	Button Mastic (Tan) Assoc. w/ Ceiling Tile	Auditorium
60, 61, 62	20	Plaster Ceiling (Smooth)	Corridors C40 & C42
63, 64, 65	21	Plaster Ceiling (Rough)	Corridor C40
66, 67, 68	22	Plaster Wall (Light Sand)	Corridors C40 & C42
69, 70, 71	23	12" x 12" Vinyl Floor Tile (Gray w/Gray & White Flecks) with Mastic	Corridors C40 & C42 and Dance Room
72, 73, 74	24	Drywall Wall System (Eggshell)	Dance Room
75, 76, 77	25	4" Cove Base (Black) with Adhesive	Dance Room
78, 79, 80	26	12" x 12" Vinyl Floor Tile (White w/Blue & Gray Flecks) with Mastic	Dance Room
81, 82, 83	27	12" x 12" Vinyl Floor Tile (Dark Gray) with Mastic	Dance Room
84, 85, 86	28	Button Mastic Assoc. w/Acoustic Wall Panels	Dance Room
93, 94, 95	31	4" Cove Base (White) with Adhesive	Hallway C14
96, 97, 98	32	Exterior Brick and Mortar	Building Exterior
99, 100, 101	33	Extrior Concrete Canopy	At East Entrance to Corridors C40 & C42
102, 103, 104	34	Exterior Concrete	Sidewalks and Entry Landings at Corridors C40 & C42

No asbestos was detected in the above listed samples collected and submitted for laboratory analysis. The building materials listed in this tale are not ACBM as defined by the National Emission Standards for Hazardous Air Pollutants (NESHAP 40 CFR 61 Subpart M) and the Texas Asbestos Health Protection Rules (TAHPR §296).

PHOTOGRAPHIC DOCUMENTATION

Photo 1: View of HA #2: Non-ACBM 2’ x 2’lay-in ceiling panel (pinhole).

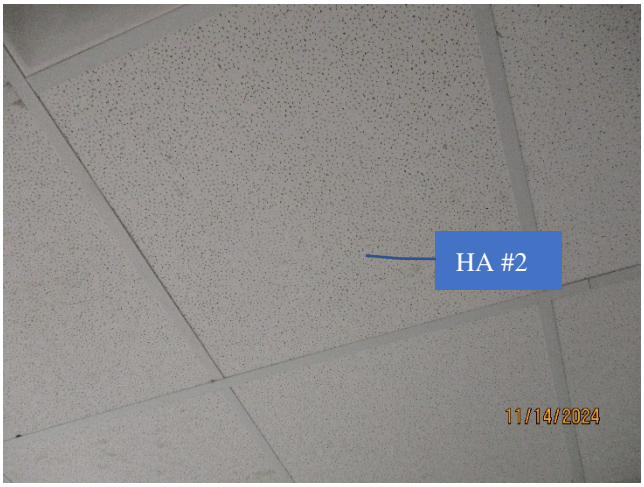

Photo 2: View of HA #2: Non-ACBM 2’ x 2’lay-in ceiling panel (chicken scratch).

Photo 3: View of HA #3: Non-ACBM Concrete Wall with Texture (Orange Peel).

Photo 4: View of HA #4: Non-ACBM concrete wall w/ texture (sandy).

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Photo 5: View of HA #5: ACBM plaster w/ texture (smooth)

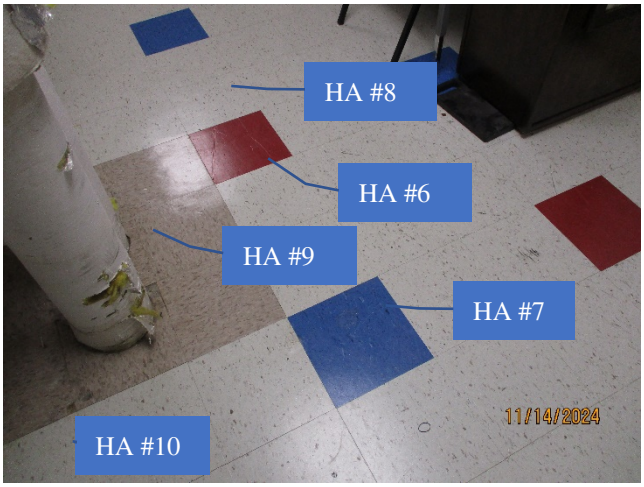

Photo 6: View of HA #6: Non-ACBM 12" x 12" VFT (red), HA #7: Non-ACBM 12" x 12" VFT (blue), HA #8: Non-ACBM 12" x 12" VFT (white w/ flecks), HA #9: Non-ACBM 12" x 12" VFT (tan w/ flecks) & HA #10: Non-ACBM 2nd layer VFT w/ mastic (yellow).

Photo 7: View of HA #11: ACBM black mastic associated with 4" cove base (gray) w/ adhesive.

Photo 8: View of HA #12: Non-ACBM concrete stair.

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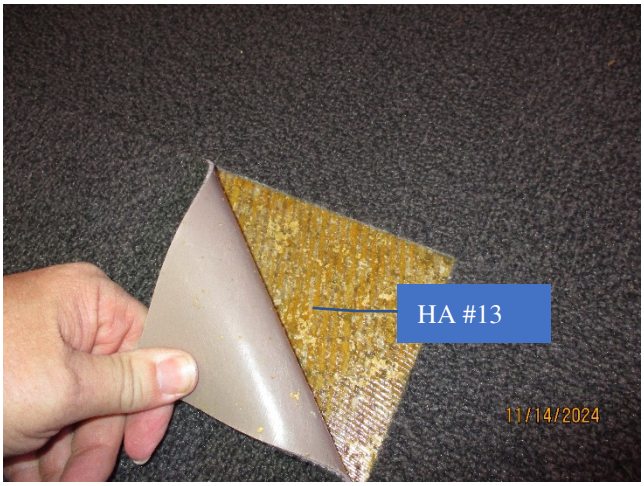

Photo 9: View of HA #13: Non-ACBM carpet square mastic (yellow).

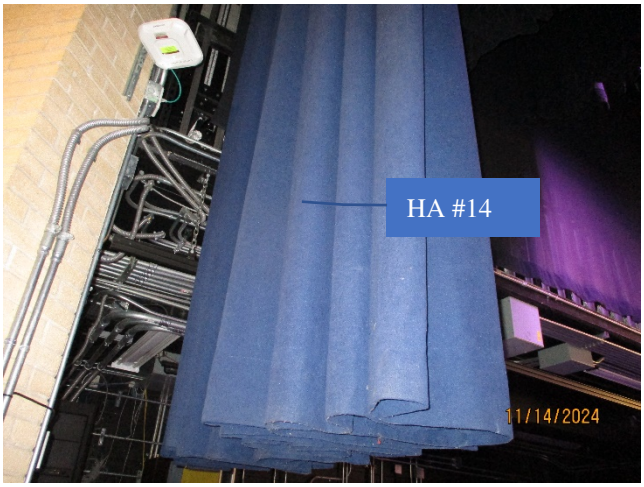

Photo 10: View of HA #14: Non-ACBM stage curtain.

Photo 11: View of HA #15: Non-ACBM vinyl stair cap.

Photo 12: View of HA #16: Non-ACBM 12” x 24” ceramic tile wall system.

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Photo 13: View of HA #17: Non-ACBM plaster ceiling (sandy).

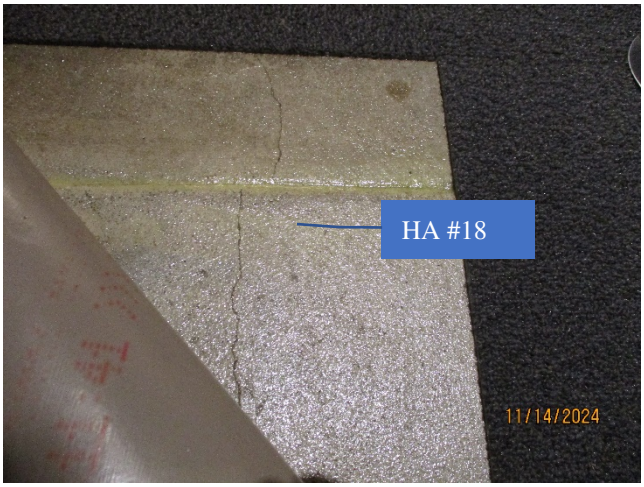

Photo 14: View of HA #18: Non-ACBM carpet square mastic (clear).

Photo 15: View of HA #19: Non-ACBM button mastic (tan) associated w/ ceiling tile.

Photo 16: View of HA #21: Non-ACBM plaster ceiling (rough).

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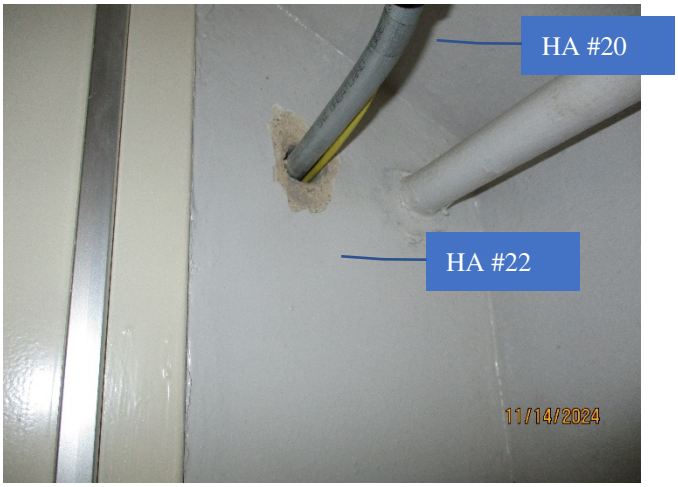

Photo 17: View of HA #20: Non-ACBM plaster ceiling (smooth) and HA #22: Non-ACBM plaster wall (light sand).

Photo 18: View of HA #23: Non-ACBM 12” x 12” (gray w/ gray & white flecks) w/ mastic.

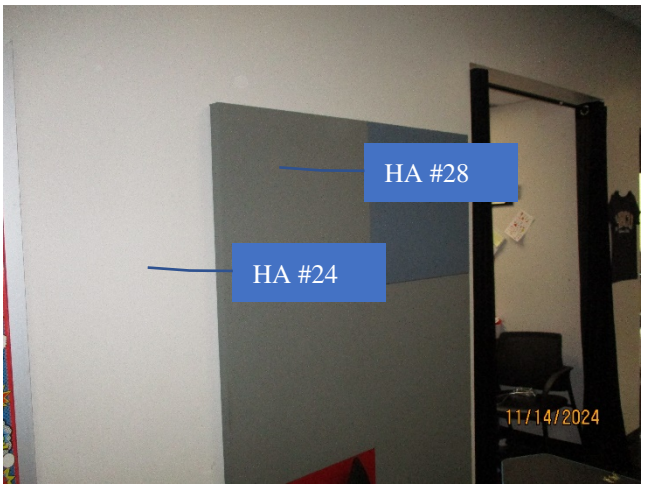

Photo 19: View of HA #24: Non-ACBM drywall wall system (eggshell) and HA #28: Non-ACBM button mastic associated with acoustic wall panels.

Photo 20: View of HA #25: Non-ACBM 4” cove base (black) w/ adhesive.

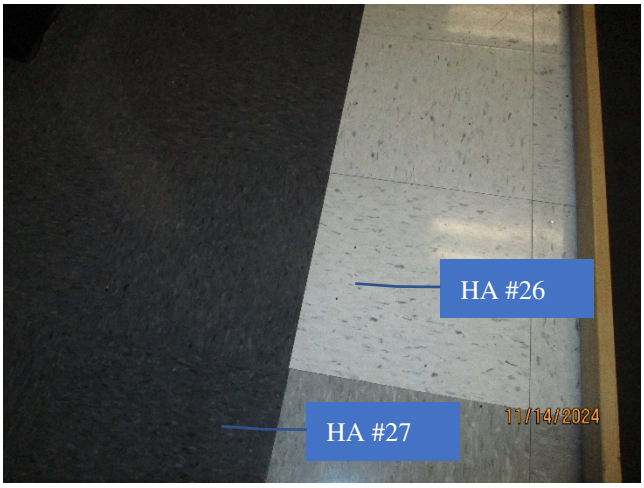

Photo 21: View of HA #26: Non-ACBM 12”x 12” VFT (white w/ blue and gray flecks) w/ mastic & HA #27: Non-ACBM 12”x 12” VFT (dary gray) w/ mastic.

Photo 22: View of HA #29: ACBM plaster wall (crow’s foot) & HA #30: ACBM ceramic cove base (tan).

Photo 23: View of HA #31: Non-ACBM 4” vinyl cove base (white) w/ adhesive.

Photo 24: View of HA #32: Non-ACBM exterior brick & mortar.

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Photo 25: View of HA #33: Non-ACBM exterior concrete canopy.

Photo 26: View of HA #34: Non-ACBM exterior concrete.

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PLM Summary Report

Moody Labs
2051 Valley View Lane
Farmers Branch, TX 75234 Phone: (972) 241-8460

NVLAP Lab Code 102056-0
TDSHS License No. 300084

Client : LCA Environmental, Inc. - Dallas, TX
Project : DISD, Carter High School
Project # : 241015
Identification : Asbestos, Bulk Sample Analysis
Test Method : Polarized Light Microscopy / Dispersion Staining (PLM/DS)
EPA Method 600 / R-93 / 116

Lab Job No. : 24B-13598
Report Date : 11/25/2024
Sample Date : 11/12/2024 & 11/14/2024

On 11/15/2024, one hundred four (104) bulk material samples were submitted by a representative of LCA Environmental, Inc. - Dallas, TX for asbestos analysis by PLM/DS. The PLM Detail Report is attached; additional information may be found therein. The results are summarized below:

Sample Number	Client Sample Description / Location	Asbestos Content
1-1A	2' x 2' Lay-in Ceiling Panel (Pinhole), Hallway C14.2	None Detected - Acoustic Tile
2-1B	2' x 2' Lay-in Ceiling Panel (Pinhole), Hallway C14	None Detected - Acoustic Tile
3-1C	2' x 2' Lay-in Ceiling Panel (Pinhole), Hallway C14.1	None Detected - Acoustic Tile
4-2A	2' x 2' Lay-in Ceiling Panel (Chicken Scratch), Hallway C14.2	None Detected - Acoustic Tile
5-2B	2' x 2' Lay-in Ceiling Panel (Chicken Scratch), Hallway C14	None Detected - Acoustic Tile
6-2C	2' x 2' Lay-in Ceiling Panel (Chicken Scratch), Hallway C14.1	None Detected - Acoustic Tile
7-3A	Concrete Wall with Texture (Orange Peel), Hallway C14.1	None Detected - Concrete No Texture None Detected - Paints
8-3B	Concrete Wall with Texture (Orange Peel), Hallway C14.1	None Detected - Concrete No Texture None Detected - Paints
9-3C	Concrete Wall with Texture (Orange Peel), Hallway C14.1	None Detected - Concrete No Texture None Detected - Paints
10-4A	Concrete Wall with Texture (Sandy), Hallway C14.2	None Detected - Concrete No Texture None Detected - Paint
11-4B	Concrete Wall with Texture (Sandy), Hallway C14.2	None Detected - Concrete No Texture None Detected - Paint
12-4C	Concrete Wall with Texture (Sandy), Hallway C14.2	None Detected - Concrete No Texture None Detected - Paint

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Sample Number	Client Sample Description / Location	Asbestos Content
13-5A	Plaster with Texture (Smooth), Hallway C14.2	None Detected - CMU None Detected - Mortar None Detected - White Plaster None Detected - Beige Plaster 2% Chrysotile - Gray Plaster No Texture None Detected - Paint
14-5B	Plaster with Texture (Smooth), Hallway C14.2	Not Analyzed - Positive Stop
15-5C	Plaster with Texture (Smooth), Hallway C14.2	Not Analyzed - Positive Stop
16-6A	12" x 12" Vinyl Floor Tile (Red) with Mastic (Yellow), Hallway C14.2	None Detected - Floor Tile None Detected - Yellow Mastic
17-6B	12" x 12" Vinyl Floor Tile (Red) with Mastic (Yellow), Hallway C14	None Detected - Floor Tile None Detected - Yellow Mastic
18-6C	12" x 12" Vinyl Floor Tile (Red) with Mastic (Yellow), Hallway C14.1	None Detected - Floor Tile None Detected - Yellow Mastic
19-7A	12" x 12" Vinyl Floor Tile (Blue) with Mastic (Yellow), Hallway C14.2	None Detected - Floor Tile None Detected - Yellow Mastic
20-7B	12" x 12" Vinyl Floor Tile (Blue) with Mastic (Yellow), Hallway C14	None Detected - Floor Tile None Detected - Yellow Mastic
21-7C	12" x 12" Vinyl Floor Tile (Blue) with Mastic (Yellow), Hallway C14.1	None Detected - Floor Tile None Detected - Yellow Mastic
22-8A	12" x 12" Vinyl Floor Tile (White with Flecks) with Mastic (Yellow), Hallway C14.2	None Detected - Floor Tile None Detected - Yellow Mastic None Detected - Green Mastic
23-8B	12" x 12" Vinyl Floor Tile (White with Flecks) with Mastic (Yellow), Hallway C14	None Detected - Floor Tile None Detected - Yellow Mastic
24-8C	12" x 12" Vinyl Floor Tile (White with Flecks) with Mastic (Yellow), Hallway C14.1	None Detected - Floor Tile None Detected - Yellow Mastic

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Sample Number	Client Sample Description / Location	Asbestos Content
25-9A	12" x 12" Vinyl Floor Tile (Tan with Flecks) with Mastic (Yellow), Hallway C14.2	None Detected - Floor Tile None Detected - Yellow Mastic
26-9B	12" x 12" Vinyl Floor Tile (Tan with Flecks) with Mastic (Yellow), Hallway C14	None Detected - Floor Tile None Detected - Yellow Mastic
27-9C	12" x 12" Vinyl Floor Tile (Tan with Flecks) with Mastic (Yellow), Hallway C14.1	None Detected - Floor Tile None Detected - Yellow Mastic
28-10A	2nd Layer Vinyl Floor Tile with Mastic (Yellow), Hallway C14	None Detected - Yellow Mastic None Detected - Leveling Compound None Detected - Floor Tile None Detected - Yellow Mastic None Detected - Leveling Compound
29-10B	2nd Layer Vinyl Floor Tile with Mastic (Yellow), Hallway C14	None Detected - Top Flooring None Detected - Yellow Mastic None Detected - Leveling Compound None Detected - Bottom Floor Tile None Detected - Yellow Mastic None Detected - Leveling Compound
30-10C	2nd Layer Vinyl Floor Tile with Mastic (Yellow), Hallway C14.1	None Detected - Yellow Mastic None Detected - Leveling Compound None Detected - Floor Tile None Detected - Yellow Mastic None Detected - Leveling Compound
31-11A	4" Cove Base (Gray) with Adhesive, Auditorium, At Stage Right Stairs	None Detected - Cove Base None Detected - Tan Adhesive
32-11B	4" Cove Base (Gray) with Adhesive, Auditorium, Northeast at Column	None Detected - Cove Base None Detected - Tan Adhesive 3% Chrysotile - Black Mastic
33-11C	4" Cove Base (Gray) with Adhesive, Auditorium, At Stage Left Stairs	Not Analyzed - Positive Stop
34-12A	Concrete Stair, Auditorium, Stage Right Stairs	None Detected - Concrete
35-12B	Concrete Stair, Auditorium, Stage Right Stairs	None Detected - Concrete

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Sample Number	Client Sample Description / Location	Asbestos Content
36-12C	Concrete Stair, Auditorium, Stage Right Stairs	None Detected - Concrete
37-13A	Carpet Square Mastic (Yellow), Auditorium, At Stage	None Detected - Yellow Mastic
38-13B	Carpet Square Mastic (Yellow), Auditorium, South Center Aisle	None Detected - Yellow Mastic
39-13C	Carpet Square Mastic (Yellow), Auditorium, North Center Aisle	None Detected - Yellow Mastic
40-14A	Stage Curtain, Auditorium, Stage Right	None Detected - Fabric
41-14B	Stage Curtain, Auditorium, Stage Right	None Detected - Fabric
42-14C	Stage Curtain, Auditorium, Stage Right	None Detected - Fabric
43-15A	Vinyl Stair Cap, Auditorium, Stage Right Stairs	None Detected - Stair Tread None Detected - Clear Mastic
44-15B	Vinyl Stair Cap, Auditorium, Stage Right Stairs	None Detected - Stair Tread None Detected - Clear Mastic
45-15C	Vinyl Stair Cap, Auditorium, Stage Right Stairs	None Detected - Stair Tread None Detected - Clear Mastic
46-16A	12" x 24" Ceramic Tile Wall System, Broken Area at Auditorium Entrance	None Detected - Ceramic Tile None Detected - Grout None Detected - Mortar
47-16B	12" x 24" Ceramic Tile Wall System, Broken Area at Auditorium Entrance	None Detected - Ceramic Tile None Detected - Grout None Detected - Mortar
48-16C	12" x 24" Ceramic Tile Wall System, Clean-out Access at Northeast Stairwell	None Detected - Ceramic Tile None Detected - Grout None Detected - Mortar
49-17A	Plaster Ceiling (Sandy), Auditorium Back Wall, North	None Detected - Plaster
50-17B	Plaster Ceiling (Sandy), Auditorium Back Wall, North Center	None Detected - Plaster

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Sample Number	Client Sample Description / Location	Asbestos Content
51-17C	Plaster Ceiling (Sandy), Auditorium Back Wall, Center	None Detected - Plaster
52-17D	Plaster Ceiling (Sandy), Auditorium Back Wall, South Center	None Detected - Plaster
53-17E	Plaster Ceiling (Sandy), Auditorium Back Wall, South	None Detected - Plaster
54-18A	Carpet Square Mastic (Clear), Auditorium Balcony, Main Aisle North	None Detected - Clear Mastic
55-18B	Carpet Square Mastic (Clear), Auditorium Balcony, Main Aisle Center	None Detected - Clear Mastic
56-18C	Carpet Square Mastic (Clear), Auditorium Balcony, South Center Landing	None Detected - Clear Mastic
57-19A	Button Mastic (Tan) associated with Ceiling Tile, Auditorium Balcony at Control Booth	None Detected - Tan Mastic
58-19B	Button Mastic (Tan) associated with Ceiling Tile, Auditorium Balcony at Control Booth	None Detected - Tan Mastic
59-19C	Button Mastic (Tan) associated with Ceiling Tile, Auditorium Balcony at Control Booth	None Detected - Tan Mastic
60-20A	Plaster Ceiling (Smooth), Corridor C42 Southeast	None Detected - Plaster
61-20B	Plaster Ceiling (Smooth), Corridor C40 East	None Detected - Plaster
62-20C	Plaster Ceiling (Smooth), Corridor C40 East	None Detected - Plaster
63-21A	Plaster Ceiling (Rough), Corridor C40 North	None Detected - Plaster
64-21B	Plaster Ceiling (Rough), Corridor C40 North	None Detected - Plaster
65-21C	Plaster Ceiling (Rough), Corridor C40 North	None Detected - Plaster
66-22A	Plaster Wall (Light Sand), Corridor C42 Southwest	None Detected - Plaster
67-22B	Plaster Wall (Light Sand), Corridor C40 Northeast	None Detected - Plaster
68-22C	Plaster Wall (Light Sand), Corridor C40 Southeast	None Detected - Plaster

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Sample Number	Client Sample Description / Location	Asbestos Content
69-23A	12" x 12" Vinyl Floor Tile (Gray with Gray and White Flecks) with Mastic, Corridor C42, At Door	None Detected - Floor Tile None Detected - Green Mastic None Detected - Leveling Compound
70-23B	12" x 12" Vinyl Floor Tile (Gray with Gray and White Flecks) with Mastic, Corridor C40, At Door	None Detected - Floor Tile None Detected - Green Mastic None Detected - Leveling Compound
71-23C	12" x 12" Vinyl Floor Tile (Gray with Gray and White Flecks) with Mastic, Dance Room, At Storeroom	None Detected - Floor Tile None Detected - Green Mastic None Detected - Leveling Compound
72-24A	Drywall Wall System (Eggshell), Dance Room, Northwest	None Detected - Drywall Material None Detected - Joint Compound None Detected - Texture
73-24B	Drywall Wall System (Eggshell), Dance Room, At Practice Room	None Detected - Drywall Material None Detected - Texture / Joint Cmpd
74-24C	Drywall Wall System (Eggshell), Dance Room, At Teacher's Area	None Detected - Drywall Material None Detected - Joint Compound None Detected - Texture
75-25A	4" Cove Base (Black) with Adhesive, Dance Room, Northwest	None Detected - Cove Base None Detected - Cream Adhesive
76-25B	4" Cove Base (Black) with Adhesive, Dance Room, At Practice Room	None Detected - Cove Base None Detected - Cream Adhesive
77-25C	4" Cove Base (Black) with Adhesive, Dance Room, At Teacher's Area	None Detected - Cove Base None Detected - Cream Adhesive
78-26A	12" x 12" Vinyl Floor Tile (White with Blue and Gray Flecks) with Mastic, Dance Room, At Storeroom Door	None Detected - Floor Tile None Detected - Green Mastic None Detected - Leveling Compound
79-26B	12" x 12" Vinyl Floor Tile (White with Blue and Gray Flecks) with Mastic, Dance Room, Between Storeroom and Practice Room	None Detected - Floor Tile None Detected - Green Mastic None Detected - Leveling Compound

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Sample Number	Client Sample Description / Location	Asbestos Content
80-26C	12" x 12" Vinyl Floor Tile (White with Blue and Gray Flecks) with Mastic, Dance Room, At Practice Room	None Detected - Floor Tile None Detected - Green Mastic None Detected - Leveling Compound
81-27A	12" x 12" Vinyl Floor Tile (Dark Gray) with Mastic, Dance Room, At Storeroom Door	None Detected - Floor Tile None Detected - Green Mastic None Detected - Leveling Compound
82-27B	12" x 12" Vinyl Floor Tile (Dark Gray) with Mastic, Dance Room, At Practice Room Door	None Detected - Floor Tile None Detected - Green Mastic None Detected - Leveling Compound
83-27C	12" x 12" Vinyl Floor Tile (Dark Gray) with Mastic, Dance Room, At Teacher's Area Door	None Detected - Floor Tile None Detected - Green Mastic None Detected - Leveling Compound
84-28A	Button Mastic associated with Acoustic Wall Panels, Dance Room, West Wall South	None Detected - Tan Mastic
85-28B	Button Mastic associated with Acoustic Wall Panels, Dance Room, West Wall South	None Detected - Tan Mastic
86-28C	Button Mastic associated with Acoustic Wall Panels, Dance Room, West Wall South	None Detected - Tan Mastic
87-29A	Plaster Wall (Crows Foot), Hallway C14, Northeast Corner	None Detected - Plaster
88-29B	Plaster Wall (Crows Foot), Hallway C14, Northeast Corner	None Detected - Tan Plaster 2% Chrysotile - Gray Plaster
89-29C	Plaster Wall (Crows Foot), Hallway C14, Northeast Corner	Not Analyzed - Positive Stop
90-30A	Ceramic Cove Base (Tan), Hallway C14, Northeast Corner	None Detected - Ceramic Tile 2% Chrysotile - Mortar
91-30B	Ceramic Cove Base (Tan), Hallway C14, Northeast Corner	Not Analyzed - Positive Stop
92-30C	Ceramic Cove Base (Tan), Hallway C14, Northeast Corner	Not Analyzed - Positive Stop
93-31A	4" Cove Base (White) with Adhesive, Hallway C14, Northwest Wall	None Detected - Cove Base None Detected - Yellow Adhesive

PLM Summary Report

2051 Valley View Lane
Farmers Branch, TX 75234 Phone: (972) 241-8460

NVLAP Lab Code 102056-0
TDSHS License No. 300084

Client : LCA Environmental, Inc. - Dallas, TX
Project : DISD, Carter High School
Project # : 241015
Identification : Asbestos, Bulk Sample Analysis
Test Method : Polarized Light Microscopy / Dispersion Staining (PLM/DS)
EPA Method 600 / R-93 / 116

Lab Job No. : 24B-13598
Report Date : 11/25/2024
Sample Date : 11/12/2024 & 11/14/2024

On 11/15/2024, one hundred four (104) bulk material samples were submitted by a representative of LCA Environmental, Inc. - Dallas, TX for asbestos analysis by PLM/DS. The PLM Detail Report is attached; additional information may be found therein. The results are summarized below:

Sample Number	Client Sample Description / Location	Asbestos Content
94-31B	4" Cove Base (White) with Adhesive, Hallway C14, Northwest Wall	None Detected - Cove Base None Detected - Yellow Adhesive
95-31C	4" Cove Base (White) with Adhesive, Hallway C14, Northwest Wall	None Detected - Cove Base None Detected - Yellow Adhesive
96-32A	Exterior Brick and Mortar, At Corridor C40, South	None Detected - Brick None Detected - Mortar
97-32B	Exterior Brick and Mortar, At Corridor C42, North	None Detected - Brick None Detected - Mortar
98-32C	Exterior Brick and Mortar, At Northeast Corner of Choir Room	None Detected - Brick None Detected - Mortar
99-33A	Exterior Concrete Canopy, At Corridor C40, South	None Detected - Concrete None Detected - Mortar
100-33B	Exterior Concrete Canopy, At Corridor C42, South	None Detected - Concrete None Detected - Mortar
101-33C	Exterior Concrete Canopy, At Corridor C42, North	None Detected - Concrete None Detected - Mortar
102-34A	Exterior Concrete, At Corridor C42	None Detected - Concrete
103-34B	Exterior Concrete, Corridor C42 Sidewalk East	None Detected - Concrete
104-34C	Exterior Concrete, Parking Lot Sidewalk at Bike Rack	None Detected - Concrete

These samples were analyzed by layers. Quantification, unless otherwise noted, is performed by calibrated visual estimate. The test report shall not be reproduced except in full without written approval of the laboratory. The results relate only to the items tested. These test results do not imply endorsement by NVLAP or any agency of the U.S. Government. Accredited by the National Voluntary Laboratory Accreditation Program for Bulk Asbestos Fiber Analysis under Lab Code 102056-0.

NVLAP Testing NVLAP Lab Code 102056-0

Analyst(s): Amy Le, Heather Lopez, Neil Kiphen

Lab Manager : Heather Lopez — Approved Signatory : Heather Lopez

Lab Director : Bruce Crabb — Approved Signatory : Bruce Crabb

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PLM Detail Report

Supplement to PLM Summary Report

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Project : DISD, Carter High School
Project # : 241015

Lab Job No. : 24B-13598
Report Date : 11/25/2024

Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
1-1A	Acoustic Tile (Light Gray)	100%	Cellulose Fibers	50%	11/23	NK
			Mineral Wool Fibers	30%		
			Perlite	20%		
2-1B	Acoustic Tile (Light Gray)	100%	Cellulose Fibers	50%	11/23	NK
			Mineral Wool Fibers	30%		
			Perlite	20%		
3-1C	Acoustic Tile (Light Gray)	100%	Cellulose Fibers	50%	11/23	NK
			Mineral Wool Fibers	30%		
			Perlite	20%		
4-2A	Acoustic Tile (Light Gray)	100%	Cellulose Fibers	50%	11/23	NK
			Mineral Wool Fibers	30%		
			Perlite	20%		
5-2B	Acoustic Tile (Light Gray)	100%	Cellulose Fibers	50%	11/23	NK
			Mineral Wool Fibers	30%		
			Perlite	20%		
6-2C	Acoustic Tile (Light Gray)	100%	Mineral Wool Fibers	45%	11/23	NK
			Cellulose Fibers	35%		
			Perlite	20%		
7-3A	Concrete (Beige)	98%	Aggregate	65%	11/23	NK
			Cement Binders	35%		
	No Texture					
	Paints (White / Off-White)	2%	Pigment / Binders	100%		
8-3B	Concrete (Beige)	98%	Aggregate	65%	11/23	NK
			Cement Binders	35%		
	No Texture					
	Paints (White / Off-White)	2%	Pigment / Binders	100%		

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Project # : 241015

Lab Job No. : 24B-13598
Report Date : 11/25/2024

Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
9-3C	Concrete (Beige)	97%	Aggregate	65%	11/23	NK
			Cement Binders	35%		
	No Texture					
	Paints (White / Off-White)	3%	Pigment / Binders	100%		
10-4A	Concrete (Gray)	98%	Aggregate	65%	11/23	NK
			Cement Binders	35%		
	No Texture					
	Paint (White)	2%	Pigment / Binders	100%		
11-4B	Concrete (Gray)	98%	Aggregate	65%	11/23	NK
			Cement Binders	35%		
	No Texture					
	Paint (White)	2%	Pigment / Binders	100%		
12-4C	Concrete (Gray)	98%	Aggregate	65%	11/23	NK
			Cement Binders	35%		
	No Texture					
	Paint (White)	2%	Pigment / Binders	100%		
13-5A	CMU (Gray)	17%	Aggregate	65%	11/23	NK
			Cement Binders	35%		
	Mortar (Gray)	36%	Aggregate	65%		
			Cement Binders	35%		
	White Plaster (White)	2%	Aggregate	65%		
			Calcite / Binders	35%		
	Beige Plaster (Beige)	42%	Aggregate	65%		
			Calcite / Gypsum Binders	35%		
	Gray Plaster (Grey)	2%	Chrysotile	2%		
			Aggregate	63%		
			Calcite / Binders	35%		
	No Texture					
	Paint (Light Grey)	1%	Pigment / Binders	100%		
14-5B	Not Analyzed - Positive Stop	100%			11/23	NK

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Lab Job No. : 24B-13598
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Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
15-5C	Not Analyzed - Positive Stop	100%			11/23	NK
16-6A	Floor Tile (Red)	100%	Calcite / Vinyl Binders	100%	11/23	NK
	Yellow Mastic (Yellow)	<1%	Glue Binders	100%		
17-6B	Floor Tile (Red)	98%	Calcite / Vinyl Binders	100%	11/23	NK
	Yellow Mastic (Yellow)	1%	Glue Binders	100%		
	Leveling Compound (Gray)	1%	Cellulose Fibers	3%		
			Cement Binders	97%		
18-6C	Floor Tile (Red)	99%	Calcite / Vinyl Binders	100%	11/23	NK
	Yellow Mastic (Yellow)	1%	Glue Binders	100%		
19-7A	Floor Tile (Blue)	99%	Calcite / Vinyl Binders	100%	11/23	NK
	Yellow Mastic (Yellow)	1%	Glue Binders	100%		
20-7B	Floor Tile (Blue)	99%	Calcite / Vinyl Binders	100%	11/23	NK
	Yellow Mastic (Yellow)	1%	Glue Binders	100%		
21-7C	Floor Tile (Blue)	100%	Calcite / Vinyl Binders	100%	11/23	NK
	Yellow Mastic (Yellow)	<1%	Glue Binders	100%		
22-8A	Floor Tile (White)	100%	Calcite / Vinyl Binders	100%	11/23	NK
	Yellow Mastic (Yellow)	<1%	Glue Binders	100%		
	Green Mastic (Green)	<1%	Glue Binders	100%		
23-8B	Floor Tile (White)	99%	Calcite / Vinyl Binders	100%	11/23	NK
	Yellow Mastic (Yellow)	1%	Glue Binders	100%		
24-8C	Floor Tile (White)	100%	Calcite / Vinyl Binders	100%	11/23	NK
	Yellow Mastic (Yellow)	<1%	Glue Binders	100%		
	Leveling Compound (Gray)	<1%	Cellulose Fibers	2%		
			Cement Binders	98%		
25-9A	Floor Tile (Tan)	100%	Calcite / Vinyl Binders	100%	11/23	NK
	Yellow Mastic (Yellow)	<1%	Glue Binders	100%		

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Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
26-9B	Floor Tile (Tan)	96%	Calcite / Vinyl Binders	100%	11/23	NK
	Yellow Mastic (Yellow)	2%	Glue Binders	100%		
	Leveling Compound (Gray)	2%	Cellulose Fibers	5%		
			Cement Binders	95%		
27-9C	Floor Tile (Tan)	100%	Calcite / Vinyl Binders	100%	11/23	NK
	Yellow Mastic (Yellow)	<1%	Glue Binders	100%		
	Leveling Compound (Gray)	<1%	Cellulose Fibers	5%		
			Cement Binders	95%		
28-10A	Yellow Mastic (Yellow)	1%	Glue Binders	100%	11/23	NK
	Leveling Compound (Gray)	1%	Cellulose Fibers	5%		
			Cement Binders	95%		
	Floor Tile (Beige)	97%	Calcite / Vinyl Binders	100%		
	Yellow Mastic (Yellow)	1%	Glue Binders	100%		
	Leveling Compound (Gray)	<1%	Cellulose Fibers	5%		
			Cement Binders	95%		
29-10B	Top Flooring (Red)	<1%	Vinyl Binders	100%	11/23	NK
	Yellow Mastic (Yellow)	1%	Glue Binders	100%		
	Leveling Compound (Gray)	1%	Cellulose Fibers	5%		
			Cement Binders	95%		
	Bottom Floor Tile (Light Tan)	97%	Cellulose Fibers	5%		
			Calcite / Vinyl Binders	95%		
	Yellow Mastic (Yellow)	1%	Glue Binders	100%		
	Leveling Compound (Grey)	<1%	Cellulose Fibers	5%		
			Cement Binders	95%		

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Client : LCA Environmental, Inc. - Dallas, TX
Project : DISD, Carter High School
Project # : 241015

Lab Job No. : 24B-13598
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Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
30-10C	Yellow Mastic (Yellow)	1%	Glue Binders	100%	11/23	NK
	Leveling Compound (Gray)	1%	Cellulose Fibers	5%		
			Cement Binders	95%		
	Floor Tile (Beige)	97%	Calcite / Vinyl Binders	100%		
	Yellow Mastic (Yellow)	1%	Glue Binders	100%		
	Leveling Compound (Gray)	<1%	Cellulose Fibers	5%		
			Cement Binders	95%		
31-11A	Cove Base (Gray)	98%	Calcite / Vinyl Binders	100%	11/23	NK
	Tan Adhesive (Tan)	2%	Calcite	40%		
			Glue Binders	60%		
32-11B	Cove Base (Gray)	98%	Calcite / Vinyl Binders	100%	11/23	NK
	Tan Adhesive (Tan)	2%	Calcite	40%		
			Glue Binders	60%		
	Black Mastic (Black)	<1%	Chrysotile	3%		
			Tar Binders	97%		
33-11C	Not Analyzed - Positive Stop	100%			11/23	NK
34-12A	Yellow Mastic (Yellow)	1%	Glue Binders	100%	11/23	NK
	Concrete (Gray)	99%	Aggregate	65%		
			Cement Binders	35%		
35-12B	Yellow Mastic (Yellow)	5%	Glue Binders	100%	11/23	NK
	Concrete (Gray)	95%	Aggregate	65%		
			Cement Binders	35%		
36-12C	Yellow Mastic (Yellow)	1%	Glue Binders	100%	11/23	NK
	Concrete (Gray)	99%	Aggregate	65%		
			Cement Binders	35%		
37-13A	Yellow Mastic (Yellow)	100%	Glue Binders	100%	11/23	NK
38-13B	Yellow Mastic (Yellow)	100%	Glue Binders	100%	11/23	NK
39-13C	Yellow Mastic (Yellow)	100%	Glue Binders	100%	11/23	NK
40-14A	Fabric (Blue)	100%	Synthetic Fibers	100%	11/23	HL

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Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
41-14B	Fabric (Blue)	100%	Synthetic Fibers	100%	11/23	HL
42-14C	Fabric (Blue)	100%	Synthetic Fibers	100%	11/23	HL
43-15A	Stair Tread (Black)	95%	Calcite / Vinyl Binders	100%	11/23	HL
	Clear Mastic (Clear)	5%	Glue Binders	100%		
44-15B	Stair Tread (Black)	95%	Calcite / Vinyl Binders	100%	11/23	HL
	Clear Mastic (Clear)	5%	Glue Binders	100%		
45-15C	Stair Tread (Black)	95%	Calcite / Vinyl Binders	100%	11/23	HL
	Clear Mastic (Clear)	5%	Glue Binders	100%		
46-16A	Ceramic Tile (Black)	50%	Sintered Clays	100%	11/23	HL
	Grout (Gray)	20%	Aggregate	65%		
			Cement Binders	35%		
	Mortar (Gray)	30%	Aggregate	65%		
			Cement Binders	35%		
47-16B	Ceramic Tile (Black)	80%	Sintered Clays	100%	11/23	HL
	Grout (Gray)	10%	Aggregate	65%		
			Cement Binders	35%		
	Mortar (Gray)	10%	Aggregate	65%		
			Cement Binders	35%		
48-16C	Ceramic Tile (Black)	40%	Sintered Clays	100%	11/23	HL
	Grout (Gray)	30%	Aggregate	65%		
			Cement Binders	35%		
	Mortar (Gray)	30%	Aggregate	65%		
			Cement Binders	35%		
49-17A	Plaster (Light Gray)	100%	Aggregate	65%	11/23	HL
			Calcite / Binders	35%		
50-17B	Plaster (Light Gray)	100%	Aggregate	65%	11/23	HL
			Calcite / Binders	35%		
51-17C	Plaster (Light Gray)	100%	Aggregate	65%	11/23	HL
			Calcite / Binders	35%		

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Lab Job No. : 24B-13598
Report Date : 11/25/2024

Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
52-17D	Plaster (Light Gray)	100%	Aggregate	65%	11/23	HL
			Calcite / Binders	35%		
53-17E	Plaster (Light Gray)	100%	Aggregate	65%	11/23	HL
			Calcite / Binders	35%		
54-18A	Clear Mastic (Clear)	100%	Glue Binders	100%	11/23	HL
55-18B	Clear Mastic (Clear)	100%	Glue Binders	100%	11/23	HL
56-18C	Clear Mastic (Clear)	100%	Glue Binders	100%	11/23	HL
57-19A	Tan Mastic (Tan)	100%	Glue Binders	100%	11/23	HL
58-19B	Tan Mastic (Tan)	100%	Glue Binders	100%	11/23	HL
59-19C	Tan Mastic (Tan)	100%	Glue Binders	100%	11/23	HL
60-20A	Plaster (Light Gray)	95%	Aggregate	65%	11/23	HL
			Calcite / Binders	35%		
	Texture (White)	5%	Calcite / Talc / Binders	100%		
61-20B	Plaster (Light Gray)	100%	Aggregate	65%	11/23	HL
			Calcite / Binders	35%		
62-20C	Plaster (Light Gray)	100%	Aggregate	65%	11/23	HL
			Calcite / Binders	35%		
63-21A	Plaster (Off-White)	100%	Perlite	65%	11/23	HL
			Binders / Fillers	35%		
64-21B	Plaster (Off-White)	100%	Perlite	65%	11/23	HL
			Binders / Fillers	35%		
65-21C	Plaster (Off-White)	100%	Perlite	65%	11/23	HL
			Binders / Fillers	35%		
66-22A	Plaster (Light Gray)	100%	Aggregate	65%	11/23	HL
			Calcite / Binders	35%		
67-22B	Plaster (Light Gray)	100%	Aggregate	65%	11/23	HL
			Calcite / Binders	35%		

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Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
68-22C	Plaster (Light Gray)	100%	Aggregate	65%	11/23	HL
			Calcite / Binders	35%		
69-23A	Floor Tile (Gray)	94%	Calcite / Vinyl Binders	100%	11/23	HL
	Green Mastic (Green)	1%	Glue Binders	100%		
	Leveling Compound (Gray)	5%	Cellulose Fibers	5%		
			Cement Binders	95%		
70-23B	Floor Tile (Gray)	94%	Calcite / Vinyl Binders	100%	11/23	HL
	Green Mastic (Green)	1%	Glue Binders	100%		
	Leveling Compound (Gray)	5%	Cellulose Fibers	5%		
			Cement Binders	95%		
71-23C	Floor Tile (Gray)	94%	Calcite / Vinyl Binders	100%	11/23	HL
	Green Mastic (Green)	1%	Glue Binders	100%		
	Leveling Compound (Gray)	5%	Cellulose Fibers	5%		
			Cement Binders	95%		
72-24A	Drywall Material (White)	25%	Glass Wool Fibers	2%	11/23	HL
			Gypsum / Binders	98%		
	DW Paper / Tape (Tan / White)	25%	Cellulose Fibers	100%		
	Joint Compound (White)	25%	Calcite / Talc / Binders	100%		
	Texture (White)	25%	Calcite / Talc / Binders	100%		
73-24B	Drywall Material (White)	50%	Glass Wool Fibers	2%	11/23	HL
			Gypsum / Binders	98%		
	DW Paper Facing (Tan)	25%	Cellulose Fibers	100%		
	Texture / Joint Cmpd (White)	25%	Calcite / Talc / Binders	100%		
74-24C	Drywall Material (White)	25%	Glass Wool Fibers	2%	11/23	HL
			Gypsum / Binders	98%		
	DW Paper / Tape (Tan / White)	25%	Cellulose Fibers	100%		
	Joint Compound (White)	25%	Calcite / Talc / Binders	100%		
	Texture (White)	25%	Calcite / Talc / Binders	100%		

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Project # : 241015

Lab Job No. : 24B-13598
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Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
75-25A	Cove Base (Black)	95%	Calcite / Vinyl Binders	100%	11/23	HL
	Cream Adhesive (Cream)	5%	Calcite	50%		
			Glue Binders	50%		
76-25B	Cove Base (Black)	95%	Calcite / Vinyl Binders	100%	11/23	HL
	Cream Adhesive (Cream)	5%	Calcite	50%		
			Glue Binders	50%		
77-25C	Cove Base (Black)	95%	Calcite / Vinyl Binders	100%	11/23	HL
	Cream Adhesive (Cream)	5%	Calcite	50%		
			Glue Binders	50%		
78-26A	Floor Tile (White)	93%	Calcite / Vinyl Binders	100%	11/23	HL
	Green Mastic (Green)	2%	Glue Binders	100%		
	Leveling Compound (Gray)	5%	Cellulose Fibers	5%		
			Cement Binders	95%		
79-26B	Floor Tile (White)	93%	Calcite / Vinyl Binders	100%	11/23	HL
	Green Mastic (Green)	2%	Glue Binders	100%		
	Leveling Compound (Gray)	5%	Cellulose Fibers	5%		
			Cement Binders	95%		
80-26C	Floor Tile (White)	93%	Calcite / Vinyl Binders	100%	11/23	HL
	Green Mastic (Green)	2%	Glue Binders	100%		
	Leveling Compound (Gray)	5%	Cellulose Fibers	5%		
			Cement Binders	95%		
81-27A	Floor Tile (Dark Gray)	95%	Calcite / Vinyl Binders	100%	11/23	AL
	Green Mastic (Green)	1%	Glue Binders	100%		
	Leveling Compound (Gray)	4%	Cellulose Fibers	5%		
			Cement Binders	95%		
82-27B	Floor Tile (Dark Gray)	96%	Calcite / Vinyl Binders	100%	11/23	AL
	Green Mastic (Green)	3%	Glue Binders	100%		
	Leveling Compound (Gray)	1%	Cellulose Fibers	5%		
			Cement Binders	95%		

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Client : LCA Environmental, Inc. - Dallas, TX
Project : DISD, Carter High School
Project # : 241015

Lab Job No. : 24B-13598
Report Date : 11/25/2024

Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
83-27C	Floor Tile (Dark Gray)	98%	Calcite / Vinyl Binders	100%	11/23	AL
	Green Mastic (Green)	1%	Glue Binders	100%		
	Leveling Compound (Gray)	1%	Cellulose Fibers	5%		
			Cement Binders	95%		
84-28A	Tan Mastic (Tan)	100%	Calcite	40%	11/23	AL
			Glue Binders	60%		
85-28B	Tan Mastic (Tan)	100%	Calcite	40%	11/23	AL
			Glue Binders	60%		
86-28C	Tan Mastic (Tan)	100%	Calcite	40%	11/23	AL
			Glue Binders	60%		
87-29A	Plaster (Tan)	100%	Aggregate	65%	11/23	AL
			Calcite / Binders	35%		
88-29B	Tan Plaster (Tan)	85%	Aggregate	65%	11/23	AL
			Calcite / Binders	35%		
	Gray Plaster (Gray)	15%	Chrysotile	2%		
			Aggregate	63%		
			Calcite / Binders	35%		
89-29C	Not Analyzed - Positive Stop	100%			11/23	AL
90-30A	Ceramic Tile (Tan / White)	75%	Sintered Clays	100%	11/23	AL
	Mortar (Gray)	25%	Chrysotile	2%		
			Aggregate	63%		
			Cement Binders	35%		
91-30B	Not Analyzed - Positive Stop	100%			11/23	AL
92-30C	Not Analyzed - Positive Stop	100%			11/23	AL
93-31A	Cove Base (White)	93%	Calcite / Vinyl Binders	100%	11/23	AL
	Yellow Adhesive (Yellow)	7%	Calcite	40%		
			Glue Binders	60%		

Moody Labs
2051 Valley View Lane
Farmers Branch, TX 75234 Phone: (972) 241-8460

PLM Detail Report

Supplement to PLM Summary Report

NVLAP Lab Code 102056-0
TDSHS License No. 300084

Client : LCA Environmental, Inc. - Dallas, TX
Project : DISD, Carter High School
Project # : 241015

Lab Job No. : 24B-13598
Report Date : 11/25/2024

Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
94-31B	Cove Base (White)	93%	Calcite / Vinyl Binders	100%	11/23	AL
	Yellow Adhesive (Yellow)	7%	Calcite	40%		
			Glue Binders	60%		
95-31C	Cove Base (White)	95%	Calcite / Vinyl Binders	100%	11/23	AL
	Yellow Adhesive (Yellow)	5%	Calcite	40%		
			Glue Binders	60%		
96-32A	Brick (Tan)	90%	Sintered Clays	100%	11/23	AL
	Mortar (Tan)	10%	Aggregate	65%		
			Cement Binders	35%		
97-32B	Brick (Tan)	90%	Sintered Clays	100%	11/23	AL
	Mortar (Gray)	10%	Aggregate	65%		
			Cement Binders	35%		
98-32C	Brick (Tan)	70%	Sintered Clays	100%	11/23	AL
	Mortar (Gray)	30%	Aggregate	65%		
			Cement Binders	35%		
99-33A	Concrete (Gray)	95%	Aggregate	65%	11/23	AL
			Cement Binders	35%		
	Mortar (White)	5%	Aggregate	65%		
			Calcite / Binders	35%		
100-33B	Concrete (Gray)	75%	Aggregate	65%	11/23	AL
			Cement Binders	35%		
	Mortar (White)	25%	Aggregate	65%		
			Calcite / Binders	35%		
101-33C	Concrete (Gray)	90%	Aggregate	65%	11/23	AL
			Cement Binders	35%		
	Mortar (White)	10%	Aggregate	65%		
			Calcite / Binders	35%		
102-34A	Concrete (Gray)	100%	Aggregate	65%	11/23	AL
			Cement Binders	35%		

Moody Labs
2051 Valley View Lane
Farmers Branch, TX 75234 Phone: (972) 241-8460

PLM Detail Report

Supplement to PLM Summary Report

NVLAP Lab Code 102056-0
TDSHS License No. 300084

Client : LCA Environmental, Inc. - Dallas, TX
Project : DISD, Carter High School
Project # : 241015

Lab Job No. : 24B-13598
Report Date : 11/25/2024

Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
103-34B	Concrete (Gray)	100%	Aggregate	65%	11/23	AL
			Cement Binders	35%		
104-34C	Concrete (Gray)	100%	Aggregate	65%	11/23	AL
			Cement Binders	35%		

Moody Labs

Chain of Custody

Lab Job # 246-13598
Lab Job # 104 PLM
Lab Job #

AFTER HOURS / WEEKEND WORK: ☐ YES ☐ NO
Please call in advance for after hours / immediate pricing & availability

Page 1 of 4

ASBESTOS PLM
Bulk ☐ Immediate ☐ 1 day ☐ 2 day ☐ 3 day ☒ 5-7 day
☐ **Analyze All** ☒ **Positive Stop**

PCM Air (7400)
☐ Immediate ☐ 1 day ☐ 2 day ☐ 3 day ☐ 5 day
Analyze Blanks ☐ **Yes** ☐ **No**

TOTAL DUST(0500/0600)
☐ 1 day ☐ 2 day

ASBESTOS TEM
Air AHERA Method ☐ Late Night* ☐ 6 hr ☐ 12 hr ☐ 24 hr
Air 7402 (Modified) ☐ 1 day ☐ 2 day ☐ 3 day
Bulk ☐ 1 day ☐ 2 day ☐ 3 day ☐ 5 day
Water/Wipe/Micro Vac ☐ 1 day ☐ 2 day ☐ 3 day
Analyze Blanks ☐ **Yes** ☐ **No**
*Late night analysis surcharges apply

MOLD
Direct Exam ☐ Immed ☐ 1 day ☐ 2 day ☐ 5 day
Standard Air ☐ Immed ☐ 1 day ☐ 2 day ☐ 5 day
Expanded Air ☐ Immed ☐ 1 day ☐ 2 day ☐ 5 day
TPC w/ Yeast & Mold (TYMC)** ☐ 5 day
Culture** ☐ 14 days
Analyze Blanks ☐ **Yes** ☐ **No**

BACTERIA**
Total Plate Count (TAMC) ☐ 2 day
Coliform & E. coli (P/A) ☐ 1 day
Coliform & E. coli (Q) ☐ 1 day
Please note Bacteria / Mold Culture turnarounds are approximate and subject to analytical requirements

OTHER: ✓

Billing Company / City: LCA Environmental, Inc. # of Samples: 104 Sample Date: 11/12+14/24
Project: DISD - CARTER HIGH SCHOOL Project #: 24/1015
Contact Information: Name: Thomas Hale Phone #: 972-241-6680
E-mail Results to: LCA Group Mobile #: 214-403-8298
Invoice Address: P.O. #:

Please review paperwork and samples before submitting to lab. Unsealed / improperly packaged / damaged / expired samples or excessive administrative requests may incur additional fees
Notes:

Sample #	Sample Description	Vol. / Area (if applicable)	Location / Notes
1 - 1A	2'x2' LAY-IN CEILING PANEL (PIN HOLE)		HALLWAY C14.2
2 - 1B	"		" C14
3 - 1C	"		" C14.1
4 - 2A	2'x2' LAY-IN CEILING PANEL (CHICKEN SCRATCH)		HALLWAY C14.2
5 - 2B	"		" C14
6 - 2C	"		" C14.1
7 - 3A	CONCRETE WALL W/ TEXTURE (ORANGE PEEL)		HALLWAY C14.1
8 - 3B	"		" "
9 - 3C	"		" "
10 - 4A	CONCRETE WALL W/ TEXTURE (SANDY)		HALLWAY C14.2
11 - 4B	"		" "
12 - 4C	"		" "
13 - 5A	PLASTER WALL W/ TEXTURE (SMOOTH)		HALLWAY C14.2
14 - 5B	"		" "
15 - 5C	"		" "

Released By:	Date / Time:	Received By:	Date / Time:
[signature]	11/15/24 934	[signature]	11/15/24 9:36A
Released By:	Date / Time:	Received By:	Date / Time:

Moody Labs

Chain of Custody

Lab Job # 24-13598
Lab Job #
Lab Job #

Project: DISD CARTER HIGH SCHOOL Project #: 24/015 Page 2 of 4

		Sample Description	Vol. / Area (if applicable)	Location / Notes
•	16 - 6A	12"X12" VINYL FLOOR TILE (RED) W/ MASTIC (YELLOW)		HALLWAY C14.2
	17 - 6B	⊥		⊥ C14
	18 - 6C	⊥		⊥ C14.1
•	19 - 7A	12"X12" VINYL FLOOR TILE (BLUE) W/MASTIC (YELLOW)		HALLWAY C14.2
	20 - 7B	⊥		⊥ C14
	21 - 7C	⊥		⊥ C14.1
•	22 - 8A	12"X12" VINYL FLOOR TILE (WHITE W/FLECKS) W/MASTIC (YELLOW)		HALLWAY C14.2
	23 - 8B	⊥		⊥ C14
	24 - 8C	⊥		⊥ C14.1
•	25 - 9A	12"X12" VINYL FLOOR TILE (TAN W/FLECKS) W/MASTIC (YELLOW)		HALLWAY C14.2
	26 - 9B	⊥		⊥ C14
	27 - 9C	⊥		⊥ C14.1
	28 - 10A	2ND LAYER VINYL FLOOR TILE W/MASTIC (YELLOW)		HALLWAY C14
	29 - 10B	⊥		⊥ 1
	30 - 10C	⊥		⊥ C14.1
•	31 - 11A	4" COVE BASE (GRAY) W/ ADHESIVE		AUDITORIUM AT STAGE RIGHT STAIRS
	32 - 11B	⊥		⊥ NE AT COLUMN
	33 - 11C	⊥		⊥ AT STAGE LEFT STAIRS
•	34 - 12A	CONCRETE STAIR		AUDITORIUM STAGE RIGHT STAIRS
	35 - 12B	⊥		⊥ ⊥
	36 - 12C	⊥		⊥ ⊥
•	37 - 13A	CARPET SQUARE MASTIC (YELLW)		AUDITORIUM AT STAGE
	38 - 13B	⊥		⊥ SOUTH CENTER AISLE
	39 - 13C	⊥		⊥ NORTH CENTER AISLE
•	40 - 14A	STAGE CURTAIN		AUDITORIUM STAGE RIGHT
	41 - 14B	⊥		⊥ ⊥
	42 - 14C	⊥		⊥ ⊥
•	43 - 15A	VINYL STAIR CAP		AUDITORIUM STAGE RIGHT STAIRS
	44 - 15B	⊥		⊥ ⊥
	45 - 15C	⊥		⊥ ⊥
•	46 - 16A	12"x24" CERAMIC TILE WALL SYSTEM		BROKEN AREA AT AUDITORIUM ENTRANCE

Moody Labs

Chain of Custody

Lab Job # 246-13598
Lab Job #
Lab Job #

Project: DISD - CARTER HIGH SCHOOL Project #: 241015 Page 3 of 4

		Sample Description	Vol. / Area (if applicable)	Location / Notes
	47 - 16B	12"X24" CERAMIC TILE WALL SYSTEM		BROKEN AREA AT AUDITORIUM ENTRANCE
	48 - 16C	⊥		CLEAN-OUT ACCESS AT NE STAIRWELL
•	49 - 17A	PLASTER CEILING (SANDY)		AUDITORIUM BACK WALL NORTH
	50 - 17B			NORTH CENTER
	51 - 17C			CENTER
	52 - 17D			SOUTH CENTER
	53 - 17E			SOUTH
•	54 - 18A	CARPET SQUARE MASTIC (CLEAR)		AUDITORIUM BALCONY MAIN AISLE NORTH
	55 - 18B			MAIN AISLE CENTER
	56 - 18C			SOUTH CENTER LANDING
•	57 - 19A	BUTTON MASTIC (TAN) ASSOC. W/ CEILING TILE		AUDITORIUM BALCONY AT CONTROL BOOTH
	58 - 19B			
	59 - 19C			
•	60 - 20A	PLASTER CEILING (SMOOTH)		CORRIDOR C42 SE
	61 - 20B			CORRIDOR C40 EAST
	62 - 20C			⊥ ⊥ ⊥
•	63 - 21A	PLASTER CEILING (ROUGH)		CORRIDOR C40 NORTH
	64 - 21B			
	65 - 21C			
•	66 - 22A	PLASTER WALL (LIGHT SAND)		CORRIDOR C42 SW
	67 - 22B			CORRIDOR C40 NE
	68 - 22C			⊥ ⊥ SE
•	69 - 23A	12"X12" VINYL FLOOR TILE (GRAY W/ GRAY+WHITE FLECKS) W/ MASTIC		CORRIDOR C42 AT DOOR
	70 - 23B			CORRIDOR C40 AT DOOR
	71 - 23C			DANCE ROOM AT STORE ROOM
•	72 - 24A	DRYWALL WALL SYSTEM (EGGSHELL)		DANCE ROOM NW
	73 - 24B			AT PRACTICE ROOM
	74 - 24C			AT TEACHER'S AREA
•	75 - 25A	4" COVE BASE (BLACK) W/ ADHESIVE		DANCE ROOM NW
	76 - 25B			AT PRACTICE ROOM
	77 - 25C			AT TEACHER'S AREA

Moody Labs

Chain of Custody

Lab Job # 25-13598
Lab Job #
Lab Job #

Project: DISD · CARTER HIGH SCHOOL Project #: 241015 Page 4 of 4

		Sample Description	Vol. / Area (if applicable)	Location / Notes
•	78 - 26A	12"X12" VINYL FLOOR TILE (WHITE W/BLUE+GRAY FLECKS) W/MASTIC		DANCE ROOM AT STORE ROOM DOOR
	79 - 26B	⊥		BETWEEN STORE ROOM & PRACTICE RM.
	80 - 26C	⊥		AT PRACTICE ROOM
•	81 - 27A	12"X12" VINYL FLOOR TILE (DARK GRAY) W/ MASTIC		AT STORE ROOM DOOR
	82 - 27B	⊥		AT PRACTICE ROOM DOOR
	83 - 27C	⊥		AT TEACHER'S AREA DOOR
•	84 - 28A	BUTTON MASTIC ASSOC. W/ ACOUSTIC WALL PANELS		WEST WALL SOUTH
	85 - 28B	⊥		⊥ ⊥ ⊥
	86 - 28C	⊥		⊥ ⊥ ⊥
•	87 - 29A	PLASTER WALL (CROW'S FOOT)		HALLWAY C14 NE CORNER
	88 - 29B	⊥		⊥ ⊥
	89 - 29C	⊥		⊥ ⊥
•	90 - 30A	CERAMIC COVE BASE (TAN)		C14 NE CORNER
	91 - 30B	⊥		⊥ ⊥
	92 - 30C	⊥		⊥ ⊥
•	93 - 31A	4" COVE BASE (WHITE) W/ ADHESIVE		C14 NW WALL
	94 - 31B	⊥		⊥ ⊥
	95 - 31C	⊥		⊥ ⊥
•	96 - 32A	EXTERIOR BRICK & MORTAR		AT CORRIDOR C40 SOUTH
	97 - 32B	⊥		AT CORRIDOR C42 ~~SOUTH~~ NORTH
	98 - 32C	⊥		AT NE CORNER OF CHOIR ROOM
•	99 - 33A	EXTERIOR CONCRETE ~~PORTICO~~ CANOPY		AT CORRIDOR C40 SOUTH
	100 - 33B	⊥		AT CORRIDOR C42 SOUTH
	101 - 33C	⊥		⊥ NORTH
•	102 - 34A	EXTERIOR CONCRETE		AT CORRIDOR C42
	103 - 34B	⊥		CORRIDOR C42 SIDEWALK EAST
	104 - 34C	⊥		PARKING LOT SIDEWALK AT BIKE RACK

Texas Department of State Health Services

LYNN CLARK ASSOCIATES INC DBA
LCA ENVIRONMENTAL INC

is certified to perform as an

Asbestos Consultant Agency

in the State of Texas and is hereby governed by the rights, privileges and responsibilities set forth in Texas Occupations Code, Chapter 1954 and Title 12, Texas Administrative Code, Chapter 295 relating to Texas Asbestos Health Protection, as long as this license is not suspended or revoked.

License Number: 100285

Expiration Date: 12/15/2025

Jennifer Shuford, MD, MPH,
Commissioner of Health

Control Number: 97625

(Void After Expiration Date)

VOID IF ALTERED NON-TRANSFERABLE

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TEXAS
Health and Human Services

Texas Department of State Health Services

Asbestos Individual Consultant

EDWARD B BARGANIER

License Number: 105519

Control Number: 98475

Expiration Date: 9-Nov-2026

Texas Department of State Health Services

Asbestos Inspector

THOMAS A HALE

License No. 602545

Control No. 100515

Expiration Date: 18-Apr-2025

DALLAS INDEPENDENT SCHOOL DISTRICT
DAVID W. CARTER HIGH SCHOOL
GEOTECHNICAL REPORT

GEOTECHNICAL INVESTIGATION

PROPOSED BUILDING ADDITION
DAVID W. CARTER HIGH SCHOOL
DALLAS, TEXAS

AGG REPORT: DE23-229

MARCH 23, 2024

PREPARED FOR:

DALLAS ISD
Dallas, TEXAS

PRESENTED BY:

ALLIANCE GEOTECHNICAL GROUP

Geotechnical Engineering – Construction Services – Construction Materials Engineering Testing
3228 Halifax Street - Dallas, TX 75247 Ph. 972.444.8889 FX. 972.444.8893

ALLIANCE GEOTECHNICAL GROUP

CONSTRUCTION MATERIALS ENGINEERING & TESTING
GEOTECHNICAL ENGINEERING
CONSTRUCTION INSPECTION SERVICES
FORENSIC STUDIES

March 14, 2024

Mr. Chris Devereaux
Project Manager
Dallas ISD 2020 Bond Program
9400 Central Expressway, 8th floor
Dallas, Texas 75231

Phone: (972) 925-7287
Cell: (817) 703-9197
Email: C114119@dallasisd.org

Re: Geotechnical Investigation
Proposed Building Addition
David W. Carter High School – Dallas ISD
Dallas, Texas
AGG Project No. DE23-229

Dear Mr. Devereaux:

Please find enclosed our report summarizing the results of the geotechnical investigation performed at the above-referenced project. We trust the recommendations derived from this investigation will provide you with the information necessary to complete your proposed project successfully.

For your future construction materials testing and related quality control requirements, it is recommended that the work be performed by Alliance Geotechnical Group, Inc. to maintain continuity of inspection and testing services for the project under the direction of the Geotechnical Project Engineer.

We thank you for the opportunity to provide you with our professional services. If we can further assist, please do not hesitate to contact us.

Sincerely,
ALLIANCE GEOTECHNICAL GROUP, INC.

ALLIANCE GEOTECHNICAL GROUP
STATE OF TEXAS
FRANCIS MBOGNING
130623
LICENSED
PROFESSIONAL ENGINEER

Francis Mbogning, P.E.
Project Engineer

Michael D. Roland, P.E.
Vice President

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GEOTECHNICAL INVESTIGATION
PROPOSED BUILDING ADDITION
DAVID W. CARTER HIGH SCHOOL – DALLAS ISD
DALLAS, TEXAS

1.0 INTRODUCTION

1.1 PROJECT DESCRIPTION

The project consists of a new building addition to be constructed at the existing David W. Carter High School located at 1819 Wheatland Road in Dallas, Texas. We understand that the proposed building addition will be constructed on the east side of the existing mechanical yard. We understand that the existing school structure is supported by straight shaft piers in conjunction with structurally supported and suspended floor slabs.

1.2 PURPOSE AND SCOPE

The purposes of this geotechnical investigation were to: 1) explore the subsurface conditions at the site, 2) evaluate the pertinent engineering properties of the subsurface materials, 3) provide foundation recommendations for the proposed new building addition, 4) provide recommendations for new floor slab over a void space or crawl space, and 7) provide comments and recommendations for site grading and drainage. This report was prepared in general accordance with Alliance Geotechnical Group's Proposals P23-0642E dated July 6, 2023.

2.0 FIELD INVESTIGATION

The field investigation consisted of drilling a total of three (3) structural test borings (Borings B-1 thru B-3) within the vicinity of the proposed new building addition. These structural test borings were advanced to depths of 30 feet below the existing ground surface.

A truck-mounted auger drill rig was used to advance the test borings and to obtain samples for laboratory evaluation. The borings were located at the approximate locations shown on the Plan of Borings (Figure 1).

Undisturbed samples of cohesive soils were obtained at intermittent intervals with standard, thin-walled, seamless tube samplers. These samples were extruded in the field, logged, sealed, and packaged to protect them from disturbance and maintain their in-situ moisture content during transportation to our laboratory.

Foundation bearing properties of the severely weathered limestone were evaluated by the Standard Penetration Test (SPT) in conjunction with split spoon sampling. The (SPT) involves driving a standard 2-inch diameter sampler a total of eighteen inches and recording the blow counts and driving distances for each 6 inch or 50 blow increment. The first 6-inch drive is for seating purposes. The results of the (SPT) are recorded at the respective testing depths on the Logs of Borings.

The rock encountered in the test borings was evaluated by the Texas Department of Transportation Penetrometer (TxDOT Cone) Test. The TxDOT Cone is driven with the resulting penetration in inches recorded for 100 blows. The results of the TxDOT Cone Test are recorded at the respective testing depths on the Logs of Borings.

The results of the boring program are presented on the Logs of Borings, Figures 2 thru 5. A key to the descriptive terms and symbols used on the logs is presented on Figure 6.

3.0 LABORATORY TESTING

Laboratory tests were performed on representative samples of the soil to aid in classification of the soil materials. These tests included Atterberg limits tests, moisture content tests and unit weight determinations. Hand penetrometer tests were performed on the clay soil samples to provide indications of the swell potential and the foundation bearing properties of the subsurface strata. These test results are presented on the logs of borings (Figures 2 thru 4).

To provide additional information about the swell characteristics of these soils at their in-situ moisture conditioning, absorption swell tests were performed on selected samples of the slay soils. (See Figure 6). In order to determine the risk of sulfate induced heave and the corrosion risk of buried concrete, soluble sulfate testing was performed on selected samples (See Figure 7).

4.0 SITE AND SUBSURFACE CONDITIONS

4.1 GENERAL SITE CONDITIONS

The project consists of a new building addition to be constructed at the existing David W. Carter High School located at 1819 Wheatland Road in Dallas, Texas. The area for the proposed new building addition is relatively flat and covered with short grass. See Plan of Borings (Figure 1) for site configuration, location and aerial view. A photo of the project site is shown below.

4.2 SITE GEOLOGY

As shown on the Dallas Sheet of the Geologic Atlas of Texas, the site is located in an area underlain by the Austin Chalk Limestone Formation. The formation typically consists of limestone with interbedded layers of clay. Soils derived from this formation are typically plastic clays exhibiting a moderate to high shrink/swell potential with variations in moisture content.

4.3 SUBSURFACE CONDITIONS

Subsurface conditions encountered in the borings, including descriptions of the various strata, their depths, and thicknesses, are presented on the Logs of Borings. Note that depth on all borings refers to the depth from the existing grade or ground surface present at the time of the investigation. Boundaries between the various soil types are approximate.

4.4 SIESMIC SITE CLASS

The International Building Code (IBC) was reviewed to determine the seismic site class of the subject property. In accordance to ASCE 7 Table 20.3-1, the subject site has a seismic site class of C for a very dense soil/soft rock profile.

4.5 GROUNDWATER CONDITIONS

The borings were advanced using continuous flight auger methods. Advancement of the borings using these methods allows observation of the initial zones of seepage. Groundwater seepage was not encountered within the test borings during drilling and groundwater was not present at drilling completion. See Table 1 below. Shallow groundwater levels should be anticipated in all areas within the fractured weathered tan limestone if construction occurs during or after periods of rain.

TABLE 1: Summary of Groundwater Level at Each Boring Location

Boring #	Depth to water During Drilling (feet)	Depth to Water at Completion of Drilling (feet)
All borings	Not Encountered	Not Encountered

It is not possible to accurately predict the magnitude of subsurface water fluctuations that might occur based upon short-term observations. The subsurface water conditions are subject to change with variations in climatic conditions and are functions of subsurface soil conditions, and rainfall.

4.6 EXISTING FILL SOILS

Existing fill soils were present within the test borings (Borings B-1 thru B-3). The existing fill soils extended to depths ranging from 4 to 6 feet below the existing ground surface at the test boring locations. If the existing fill soils were placed in an uncontrolled manner without engineering supervision and without moisture / compaction verification of each fill lift, excessive settlements should be anticipated for slabs-on-grade, pavements and flatwork placed over existing uncontrolled fill soils.

4.7 SOIL MOVEMENT

The subsurface exploration within the building addition area revealed the presence of 8 to 10.5 feet of expansive clay and calcareous clay soils. The clay soils will have a moderate to high shrink/swell potential and the calcareous clay will have a low to moderate shrink/swell potential depending upon the soil moisture condition at the time of construction. Potential soil swell movement calculations were performed using swell test results, pocket penetrometer readings,

and moisture content tests to estimate the swell potential of the soil. Potential soil swell movement values based upon the current soil moisture conditions and current grades have been estimated to generally range from 2 to 3 inches. It should be noted that the clay soils were generally in an average moisture condition at the time of this investigation. It should be noted that if the clay soils are allowed to significantly dry prior to construction that the potential soil swell upward movements could increase to over 6+ inches.

5.0 STRAIGHT SHAFT FOUNDATION SYSTEM

The proposed new building addition should be supported by straight sided continuously reinforced shaft piers founded in the very hard gray unweathered shaley limestone stratum. The very hard gray unweathered shaley limestone was first encountered within the test borings at depths ranging from 12 to 13 feet below the existing ground surface. The depths to where the very hard gray unweathered shaley limestone was first encountered at each boring location is summarized below in Table 2.

Table 2: Depths to Bearing Stratum

Boring Number	Structure	Depth to Very Hard Gray Unweathered Shaley Limestone
B-1	Building Addition	12 feet
B-2	Building Addition	13 feet
B-3	Building Addition	12 feet

It should be noted that actual pier depths required during construction will vary depending upon the depth to bearing stratum, the depth of cuts and fills required, and the design penetrations into the bearing stratum. The allowable end bearing pressure and side resistance pressure are provided in Table 3 and have been developed based on the assumption that a minimum 2 pier diameter clear spacing will be provided between piers. For piers touching, a 50% reduction in skin friction should be used. Where the clear spacing is 2D, no reduction is necessary. For spacing between 0 and 2D, a straight-line interpolation should be used.

These foundations should be subject to settlements of about one-half inch. Differential settlements should be about one-quarter inch.

Skin friction load transfer may be counted on for penetrations into the bearing stratum below any temporary casing as specified below. The skin friction values provided are for compression loading and for resistance to soil swell uplift. For other tension loads (wing loads), the allowable skin friction is 50% of the value indicated below.

Table 3. Allowable Bearing Values

SHAFT LOADING TYPE	BEARING STRATA
	VERY HARD GRAY UNWEATHERED SHALEY LIMESTONE
Axial End Bearing	50,000 psf **
Skin Friction Side Resistance	6,500 psf *

* For penetrations into the bearing stratum exceeding one (1) foot as verified by the AGG geotechnical team. The skin friction values provided are for compression loading and for resistance to soil swell uplift. For other tension loads, the allowable skin friction is 50% of the value indicated above. All pier penetrations below temporary casing (if required) may be counted on for resistance to soil swell uplift.

** A minimum 2 feet or 1 pier diameter into very hard gray unweathered shaley limestone (whichever is greater) is recommended to develop the allowable end bearing pressure. Larger penetrations may be required to support the foundation loads. Penetrations into gray weathered limestone (identified by iron staining or tan colored seams) should not be counted on for the design penetrations during pier installations. The design penetrations should be counted on only for penetrations into continuous very hard gray unweathered shaley limestone below any temporary casing. Design penetrations should not be counted on within the cased length (if required).

Note 1: A minimum pier length of 10 feet should be provided and a minimum shaft diameter of 18 inches should be used for the straight shaft piers.

Note 2: We recommend that an AGG Geotechnical Engineer be present at the start of the drill pier operations in order to identify the proper bearing stratum to field personnel.

5.1 DRILLED SHAFT SOIL INDUCED UPLIFT LOADS

All piers will be subject to uplift loads as a result of swelling within the overlying clays. Straight shafts should be designed by the Structural Engineer with adequate penetration lengths in order to have sufficient anchorage in resisting uplift forces generated by soil swelling. The piers should have sufficient continuous vertical reinforcing steel extending to the bottom of the piers to resist the computed net uplift loads (uplift less dead load).

The magnitude of the uplift loads varies with the shaft diameter, soil parameters, free water sources, and the depth of the active clays acting on the shaft. The uplift pressures can be approximated at this site by assuming a uniform uplift pressure of 2,500 pounds per square foot acting on the shaft perimeter for a depth of 10 feet.

5.2 LATERALLY LOADED PIERS

We understand that the proposed new building addition will potentially be subject to lateral loads. L-Pile parameters recommended for design are provided below. See group reductions below.

It is recommended that the allowable lateral resistance values be neglected from the finish grade to a depth of 5 feet or 5 feet below top of pier, whichever is deeper.

Note 1: L-Pile parameters for each soil and rock strata are provided below for individual laterally loaded drilled shafts. The parameters indicated below do not include reductions related to group effects (see below).

Neglect passive resistance within upper 5 feet below finish grade or 5 feet below top of pier, whichever is deeper					
FOR OVERBURDEN SOILS and SEVERELY WEATHERED LIMESTONE (below 5 feet neglect depth).					
Water Level Condition	Material Type for LPile	Undrained Cohesion (psf)	Total Soil Unit Weight (pcf)	Strain Factor E50	Static Horizontal Modulus of Subgrade Reaction, k (pci)
Above Water	Soft Clay without Free water	1,000	120.0	0.01	100
Below Water	Soft Clay with Free water	1,000	58.0	0.01	100

Design Parameter	Design Values Hard to Very Hard Tan Weathered Limestone
Material Type	Weak Rock
Effective Unit Weight, pcf	130.0 above water 68.0 below water
Young's Modulus, psi	3,500
Uniaxial Compressive Strength (PSF)	20,000
Rock Quality Index (RQD, %)	30
Stiffness Constant (Km)	0.0005

Design Parameter	Design Values Very Hard Gray Unweathered Shaley Limestone
Material Type	Weak Rock
Effective Unit Weight, pcf	140 above water 78.0 below water
Young's Modulus, psi	30,000
Uniaxial Compressive Strength (PSF)	50,000
Rock Quality Index (RQD, %)	90
Stiffness Constant (Km)	0.0004

Note 2: Severely weathered limestone should be considered as overburden soils.

Note 3: Groundwater was not encountered within the test borings during drilling. However, shallow groundwater levels should be anticipated in all areas during and after wet weather periods within the tan fractured limestone. Therefore, shallow groundwater levels should also be considered during the L-pile studies.

Note 4: Reduction factors must be applied to account for group effects for laterally loaded piers. If the center to center spacing is less than 7D for laterally loaded piers, then an L-Pile group study using the Ensoft Group Pile Program would be required to determine the appropriate reduction factors that must be applied for laterally loaded piers. Alliance Geotechnical Group should be retained to work with the Structural Engineer in performing the Group Pile Analyses, if required. This includes group effects in the direction of loading, side by side effects, and effects in skewed directions. Otherwise, the Structural Engineer could use the information in the below paragraphs to conservatively approximate reductions for group effects.

In order to determine the appropriate reduction for group effects of a pier in a group, the reduction for side by side effects (RSS), the reduction for in-line loading effects (RIL), and the reduction for skewed effects (RSK) will need to be determined for each adjacent pier and multiplied together to determine the reduction factor for the subject pier in the group. The reduction for in-line loading effects (RIL) will consist of either leading pier (RLP) or trailing pier (RTP). Each of these reductions should be determined as recommended below.

Reduction due to Side by Side effects (RSS)

For 1D center to center spacing (piers touching), 64% of the lateral resistance should be used. Where the center to center spacing is 4D, no reduction is necessary. For a spacing between 1D and 4D, a straight-line interpolation should be used.

Reduction due to Leading Pier (RLP)

For 1D center to center spacing (piers touching), 70% of the lateral resistance should be used. Where the center to center spacing is 4D, no reduction is necessary. For a spacing between 1D and 4D, a straight-line interpolation should be used.

Reduction due to Trailing Pier (RTP)

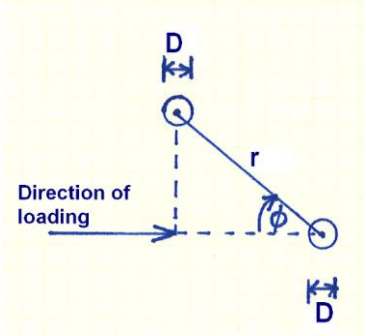
For 1D center to center spacing (piers touching), 47% of the lateral resistance should be used. Where the center to center spacing is 4D, 80% of the lateral resistance should be used. For a spacing between 1D and 4D, a straight-line interpolation should be used between the 47% to 80% of lateral resistance. Where the center to center spacing is 7D, no reduction is necessary. For a spacing between 4D and 7D, a straight-line interpolation should be used between the 80% and 100% of lateral resistance.

Reduction due to Skewed Pier (RSK)

The reduction factor for skewed piers (piers neither side-by-side or in line with the direction of loading) should be determined by the below formula.

$$RSK = (RIL^2\cos^2\emptyset + RSS^2\sin^2\emptyset)^{1/2}$$

The reduction for in-line loading effects (RIL) will consist of either leading pier (RLP) or trailing pier (RTP) whichever one is applicable to the loading direction. The center to center spacing is based upon r/D and Ø (where Ø is the angle between the direction of loading and the line between the piers as shown in the detail below).



Note 5: For all of the above reduction factors, if different size piers are used in a group, D used in the above formulas should be the largest pier diameter in the group.

5.3 DRILLED SHAFT CONSTRUCTION CONSIDERATIONS

Groundwater seepage was not encountered within the test borings during drilling and groundwater was not present at drilling completion. However, shallow groundwater seepage could be encountered within the fractured weathered tan limestone during the drill pier operations after periods of rain. If minor seepage occurs, and no caving, the pier steel and concrete should be placed immediately. Temporary casing would be required if excessive groundwater infiltration or caving soils are encountered. Temporary casing should be properly seated and sealed within the very hard gray unweathered shaley limestone to prevent seepage into the drilled shaft excavation. Care must be taken that a sufficient head of plastic concrete is maintained within the casing during extraction.

Note 1: Design penetrations should be counted for penetrations into very hard gray unweathered shaley limestone below the bottom of casing if required. Penetrations should not be counted within the cased portion of the shaft.

Concrete used for the shafts should have a slump of 4 to 6 inches and placed in a manner to avoid striking the reinforcing steel and walls of the shaft during placement. If temporary casing is required, the concrete slump should be increased to 6 to 8 inches. Complete installation of individual shafts should be accomplished within an 8-hour period in order to help prevent deterioration of bearing surfaces. The drilling of individual shafts should be excavated in a continuous operation and concrete placed as soon as practical after completion of the drilling. No shaft should be left open for more than 8 hours.

We recommend that Alliance Geotechnical Group be retained to observe and document the drilled pier construction. The engineer, or his representative, should document the shaft diameter, penetration, depth, casing installations and extractions, cleanliness, plumbness of the shaft, and the type of bearing material. Significant deviations from the specified or anticipated conditions should be reported to the owner's representative and to the Structural Engineer. The drilled pier excavation should be observed to verify the bottom of the excavation is dry and thoroughly cleaned of cuttings after completion.

Note 2: "Mushrooming" should not be allowed around piers, pier caps or grade beams.

5.4 GRADE BEAMS AND/OR PIER CAPS

Grade beams and/or pier caps supported by straight shaft piers should be constructed over void spaces. Minimum void spaces of 12 inches should be provided between the bottom of these members and the subgrade. Permanent retainer forms should be used. Structural cardboard forms are one acceptable means of providing this void beneath these members. Care must be exercised during concrete placement to avoid collapsing the cardboard void boxes. The cardboard carton forms should not be allowed to become wet or crushed prior to concrete placement. Permanent earth retainer forms should be used.

The exterior portions of the grade beams along the perimeter of the buildings should be carefully backfilled with on-site clayey soils unless specified otherwise below. The backfill soils should be placed at a moisture content between optimum and +3% above optimum. The fill should be compacted to a minimum of 95 percent of maximum dry density as determined in accordance with ASTM D698 (Standard Proctor).

6.0 FLOOR SLAB STRUCTURALLY SUPPORTED FLOOR SLAB

The subsurface exploration within the building area revealed the presence of 8 to 10.5 feet of expansive clay soils. Deep over-excavation and (8 to 10.5 feet below existing grade) and replacement with low PI select fill would be required to reduce the potential soil swell movements to acceptable levels. Since deep over-excavation cannot be performed adjacent to the existing structures unless an elaborate system of shoring and/or underpinning are used to protect the existing structures, we recommend that a structurally supported floor slab over a minimum 12-inch void space/ crawl space be used.

Due to the potential for excessive slab movements, we recommend the use of structurally supported floor slabs suspended above the underlying soils by a crawl space or minimum 12-inch void spaces. The void space created between the bottom of the floor slab and the subgrade will serve to reduce distress resulting from swell pressures generated by the clays. Any crawl space should be well ventilated and well drained. Grades within the crawl space below the suspended slab should be at least 2%. A suitable vapor barrier should be used below all floor slabs.

A structural cardboard forms could be used to provide the required voids beneath the floor slab if a suitable void system is provided below all utility lines. If carton forms are used, care should be taken to assure that the void boxes are not allowed to become wet or crushed prior to or during concrete placement and finishing operations. Masonite placed on the top of the carton forms should be used to reduce the risk of crushing of the carton forms during concrete placement and finishing operations. As a quality control measure during construction, "actual" concrete quantities placed should be checked against "anticipated" quantities. Significant concrete "overage" would be an early indication of a collapsed void.

Note 1: Crawl spaces would be preferred and are recommended to allow access for maintenance. This would allow utility lines to be hung to the floor system and suspended above the expansive clays by at least 12 inches. Otherwise, soil swell movements beneath utility lines would cause leaks and crush the pipe at connections to floor fixtures unless appropriate details are used to prevent upward pipe movement. If carton forms are used to create the void spaces, AGG recommends that fully isolated systems be used for all piping.

The expansive soils at this site will undergo shrink and swell with changes in moisture content. This soil movement can damage plumbing below the structures, especially where it connects to the structure or penetrates through grade beams. Damaged plumbing will exacerbate soil swelling below all site features. The project Mechanical Engineer should account for this concern in their design.

Where slabs are isolated from expansive soils by an under-floor voidspace, such as with a crawlspace or a space created by voidforms, under-slab plumbing should be suspended so that all plumbing is isolated from the expansive soil by a minimum of 12 inches voidspace. The void space should be a minimum of 12 inches vertically clear above the subgrade and a minimum of 12 inches horizontally clear between the subgrade and any plumbing, hangers, or supports. To protect and maintain the voidspace, soil below it should be sloped or benched on a minimum of 1H:1V or structurally retained in accordance with an approved design methodology that accounts for lateral expansion of expansive soil.

It should not be permitted for the plumbing, hangers, and supports below the slab or below the framing to be in contact with soil or any assemblage of materials that is in contact with soil. As a clarifying exception to this recommendation, it is acceptable for plumbing to be suspended by a deep foundation system. These recommendations for isolation of plumbing can be met by installing anchors and plumbing within a crawlspace after an isolated slab is installed. It should not be permitted for a slab and plumbing to be lifted off the subgrade as an assembly to create the voidspace unless the under-floor space is a crawlspace with access to allow inspection of plumbing after lifting. At each location where a plumbing line transitions to a buried condition beyond the perimeter of the foundation, a flexible connector should be provided in the plumbing system to accommodate the effects of expansive soil swelling and shrinking. The flexible expansion joint should also be isolated from soil and accessible for maintenance. These recommendations for isolation of plumbing do not apply to the portions of a plumbing system that provide drainage of an under-floor space.

Note 2: Concrete cut-off collars and/or clay plugs should be used for below grade piping adjacent to the building perimeter to minimize water seepage into the crawl space via utility trenches.

Note 3: The Structural Engineer should evaluate the effects of the crawl space excavation for the proposed building addition on the existing building's foundations and floor slabs.

Note 4: If the existing school structure has a slab-on-grade floor system, we recommend that minimum 15 foot wide, 4 to 6 inch thick seal slabs be placed adjacent to the existing structures within the crawl spaces of the additions. The required 12-inch void space should be accomplished as measured from the top of the seal slabs. The seal slabs will help minimize long-term drying and shrinkage of the supporting soils below the existing slab-on-grade sections of the existing structures. This should therefore minimize settlements of the existing slabs caused by long term evaporation and drying of soil within the void spaces and the adjacent slab-on-grade sections.

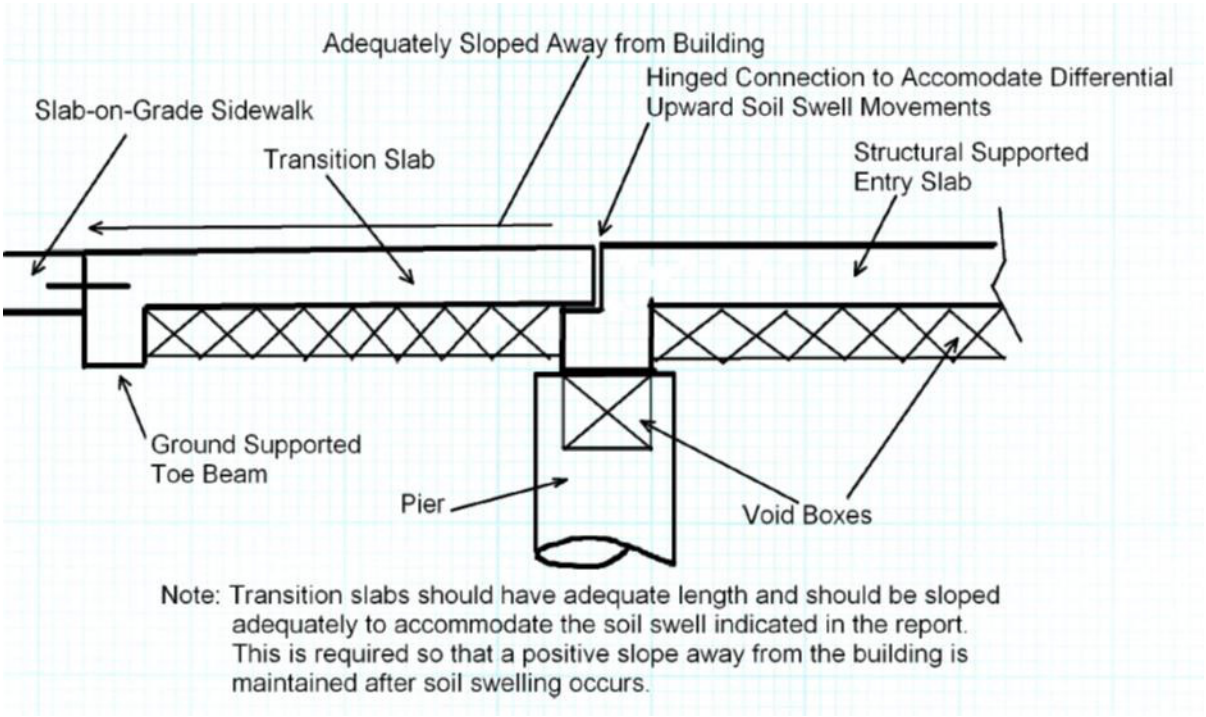
6.1 FLAT WORK AND PIPING CONSIDERATIONS

Provisions should be made for post-construction differential upward movement of adjacent flat work and piping. Site grading plans should include provisions for the effects of soil swell movements on access and entry slabs, adjacent sidewalks and all pavements. See Section 4.7 of this report. Utility line details and fixtures should consider the potential for differential

movement beneath any piping. To prevent potential tripping hazards, access and entry slabs should be elevated above the adjacent sidewalks and pavement slabs (where possible).

Civil Engineers must consider differential upward soil swell potential for Grading Plan Design. Civil Engineers should specify excavation/moisture conditioning limits to prevent negative drainage and ponding adjacent to buildings and excessive differential piping movements.

We recommend that all access and entry slabs also be structurally supported on drilled shafts and suspended above the active clays by a minimum 12-inch drained void space. To prevent potential tripping hazards, these access and entry slabs should be elevated above adjacent sidewalks and pavement slabs (if possible) and provided with transition slabs over a 12-inch void space that are hinged at grade beam connections and provided with toe beams at connections to adjacent flatwork. The toe beam should be founded a minimum of 12 inches below the bottom of the adjacent void space and be designed for an allowable bearing of 1,500 psf. Hand probings are recommended to be performed by AGG at the bottom of the toe beam to verify adequate bearing. A schematic detail of a transition slab is provided below.



All void spaces should be drained. We recommend that Alliance Geotechnical Group be retained to review the project drawings and specifications to ensure compliance with the geotechnical report.

7.0 EARTHWORK GUIDELINES

7.1 SITE GRADING AND DRAINAGE

All grading should provide positive drainage away from the proposed structures and should prevent water from collecting or discharging near the foundation. Water must not be permitted to pond adjacent to the structure or within excavations beneath suspended slabs during or after construction. Otherwise, differential soil swell movements and resulting differential foundation movements could exceed the estimates contained within this report. Also, moisture accumulations in excavation adjacent to or beneath suspended slabs will cause moisture/humidity problems during construction and after occupancy.

Leave outs for drilled shafts or around the perimeter of the structures should not be allowed to collect and hold water. These leave outs should be pumped out as needed.

Surface drainage gradients should be designed to divert surface water away from the buildings and edges of pavements. Surface drainage gradients of sidewalks, pavements, and landscaping, within 20 feet of the buildings should be constructed with maximum slopes allowed by local codes and maintained after occupancy (5% minimum in landscaping areas and 2% minimum for flatwork subject to ADA requirements). If flatter grades are used, a permanent horizontal moisture barrier should be used for a distance of 15 feet from the building (20 mil poly sheeting with UV protection attached to the building and covered with 16 inches of on-site compacted clay (compacted in 8-inch lifts above optimum to a minimum of 95% of ASTM D698).

Provisions should be made for post-construction differential upward movement of adjacent flat work. Site grading plans should include provisions for the effects of soil swell movements on access and entry slabs, adjacent sidewalks, and all pavements. See Section 4.7 of this report.

The roofs should be provided with gutters and downspouts to prevent the discharge of rainwater directly onto the ground adjacent to the building foundation. Downspouts should discharge directly onto well-drained areas or drainage swales at least 5 feet from the building. Roof downspouts and surface drain outlets should discharge into erosion–resistant areas and not into recessed planter areas. Water permitted to pond in planters, flat open areas, or areas with unsealed joints next to the structures can result in excessive slab or pavement movements and excessive moisture/humidity in crawl spaces below suspended slabs.

Exterior sidewalks and pavements will be subject to large post construction movement as indicated in this report. These potential movements should be considered during preparation of the grading plan. Flat grades should be avoided. Where concrete pavement is used, joints should

also be sealed to prevent the infiltration of water. Since post construction movement of pavement and flat work will occur, joints particularly around the buildings should be periodically inspected and resealed where necessary.

7.2 UTILITY TRENCH EXCAVATION

Trench excavation for utilities should be sloped or braced in the interest of safety. Attention is drawn to OSHA Safety and Health Standards (29 CFR 1926/1910), Subpart P, regarding trench excavations greater than 5 feet in depth. Fill placement in trenches should be performed as specified below.

7.3 PROOFROLLING AND SUBGRADE PREPARATION

Prior to placing fill in non-building areas, the exposed subgrade in areas to receive fill should be stripped and proofrolled using a fully loaded dump truck. Proofrolling can generally be accomplished using a heavy (25 ton or greater total weight) pneumatic tired roller making several passes over the areas. Where soft or compressible zones are encountered, these areas should be removed to a firm subgrade. Wet or very moist surficial materials may need to be undercut and either dried or replaced with proper compaction or replaced with a material which can be properly compacted. Any resulting void areas should be backfilled to finished subgrade in 8 inch compacted lifts compacted to a minimum of 95 percent of maximum dry density as determined by ASTM D 698 at optimum to +3% of its optimum moisture content. The upper eight (8) inches of pavement subgrade soil should be compacted at -1% to +2% of optimum moisture to a minimum of 98% of Standard Proctor density (ASTM D 698).

7.4 ON-SITE CLAY FILL PLACEMENT IN PAVEMENT AND LANDSCAPING AREAS

The on-site surficial clays may be used for general grading and filling. The fill materials should be free of surficial vegetation or debris. Clay materials should be spread in loose lifts, less than 8 inches thick and uniformly compacted to a minimum of 95 percent of the maximum density as determined by ASTM D698 (Standard Proctor) between optimum and +3% above its optimum moisture content. The upper 8 inches of subgrade soil within pavement areas should be compacted at -1% to +2% of optimum moisture to a minimum of 98% of Standard Proctor density (ASTM D698).

8.0 FIELD SUPERVISION

Many problems can be avoided or solved in the field if proper inspection and testing services are provided. It is recommended that all pier excavations, footing excavations, proofrolling, site and subgrade preparation, subgrade stabilization and pavement construction be monitored by a qualified engineering technician. Density tests should be performed to verify compaction and moisture content of any earthwork. Inspection should be performed prior to and during concrete placement operations. Alliance Geotechnical Group employs a group of experienced, well-trained technicians for inspection and construction materials testing who would be pleased to assist you on this project.

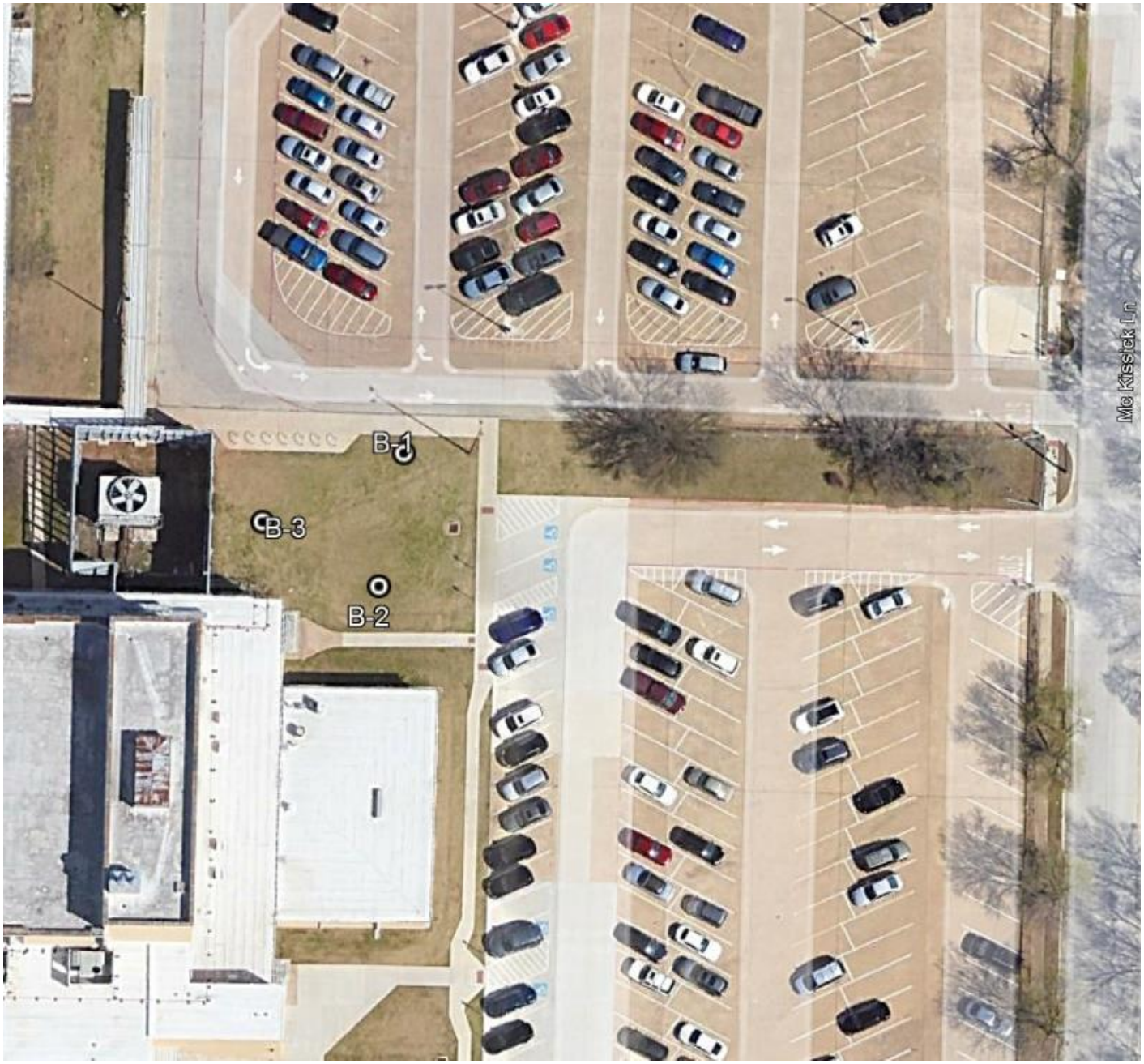
9.0 LIMITATIONS

The professional services, which have been performed, the findings obtained, and the recommendations prepared were accomplished in accordance with currently accepted geotechnical engineering principles and practices. The possibility always exists that the subsurface conditions at the site may vary somewhat from those encountered in the test borings. The number and spacing of test borings were chosen in such a manner as to decrease the possibility of undiscovered abnormalities, while considering the nature of loading, size, and cost of the project. If there are any unusual conditions differing significantly from those described herein, Alliance Geotechnical Group, Inc. should be notified to review the effects on the performance of the recommended foundation system.

The recommendations given in this report were prepared exclusively for the use of the client, their client and their consultants. The information supplied herein is applicable only for the design of the previously described development to be constructed at locations indicated at this site and should not be used for any other structures, locations, or for any other purpose.

We will retain the samples acquired for this project for a period of 30 days subsequent to the submittal date printed on the report. After this period, the samples will be discarded unless otherwise notified by the owner in writing.

FIGURES



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ALLIANCE GEOTECHNICAL GROUP

Proposal No:
DE23-229

PLAN OF BORINGS

DAVID W. CARTER HIGH SCHOOL
BUILDING ADDITION
DALLAS, TEXAS

FIGURE NO:
1

LOG OF BORING B-1

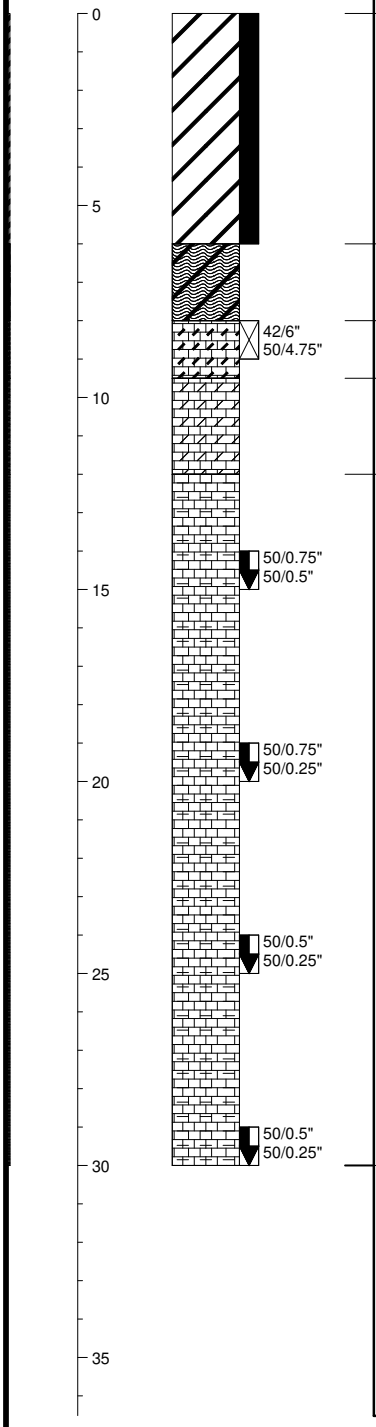
Project: **David W. Carter High School - Dallas, TX** Project No.: **DE23-229**

Date: **2/24/2024** Elev.: Location: **See Figure 1**

Depth to water at completion of boring: **Dry**

Depth to water when checked: was:

Depth to caving when checked: was:



ELEVATION/ DEPTH (feet)	DESCRIPTION	MC %	LL %	PL %	PI %	-200 %	DD pcf	P.PEN tsf	UNCON ksf	Strain %
	Dark brown, brown and tan CLAY, w/ limestone fragments and calcareous nodules (FILL)	30						3.75		
								3.25		
								3.6		
		29	69	24	45		94	3.75		
								3.2		
		27						3.5		
	Tan calcareous CLAY							2.75		
		19	49	23	26			4.5++		
	Firm to hard tan severely weathered LIMESTONE, highly fractured, w/ calcareous clay layers	16						4.5++		
	Hard to very hard tan weathered LIMESTONE, fractured, w/ calcareous clay seams									
	Very hard gray shaley LIMESTONE, w/ shale seams									
	Boring terminated at 30 feet									

Notes:

FIGURE:2

LOG OF BORING B-2

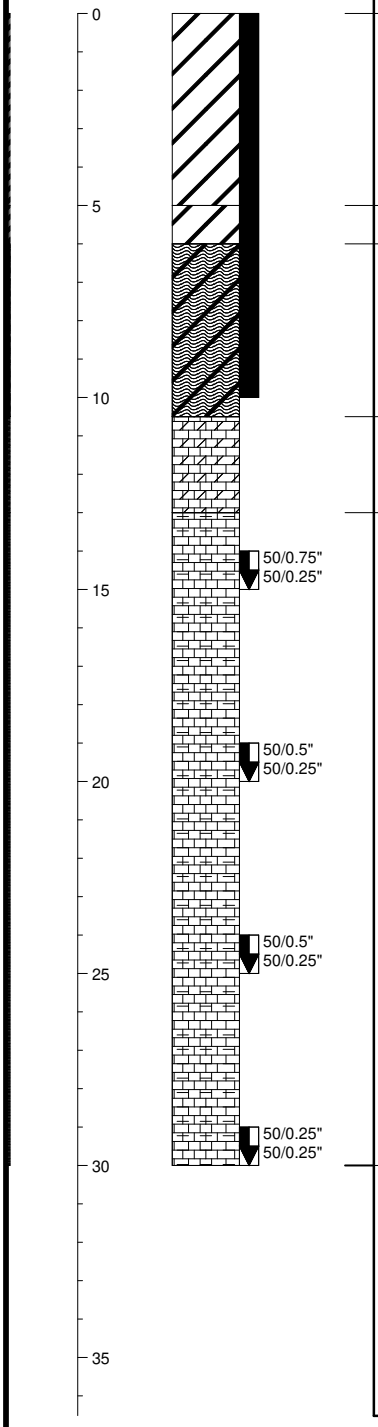
Project: **David W. Carter High School - Dallas, TX** Project No.: **DE23-229**

Date: **2/24/2024** Elev.: Location: **See Figure 1**

Depth to water at completion of boring: **Dry**

Depth to water when checked: was:

Depth to caving when checked: was:



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS & FIELD TEST DATA	DESCRIPTION	MC %	LL %	PL %	PI %	-200 %	DD pcf	P.PEN tsf	UNCON ksf	Strain %
		Dark brown and brown CLAY, w/ limestone fragments (FILL)	27	59	19	40		97	3.5+ 4.25 3.0 3.5 3.25		
		Dark brown CLAY, jointed	31	76	25	51			4.0		
		Light brown and tan calcareous CLAY, w/ limestone fragments	21	36	18	18		107	4.25 4.0 2.75 3.0		
		Hard to very hard tan weathered LIMESTONE, fractured, w/ clay seams									
		Very hard gray shaley LIMESTONE, w/ shale seams									
		Boring terminated at 30 feet									

Notes:

FIGURE:3

LOG OF BORING B-3

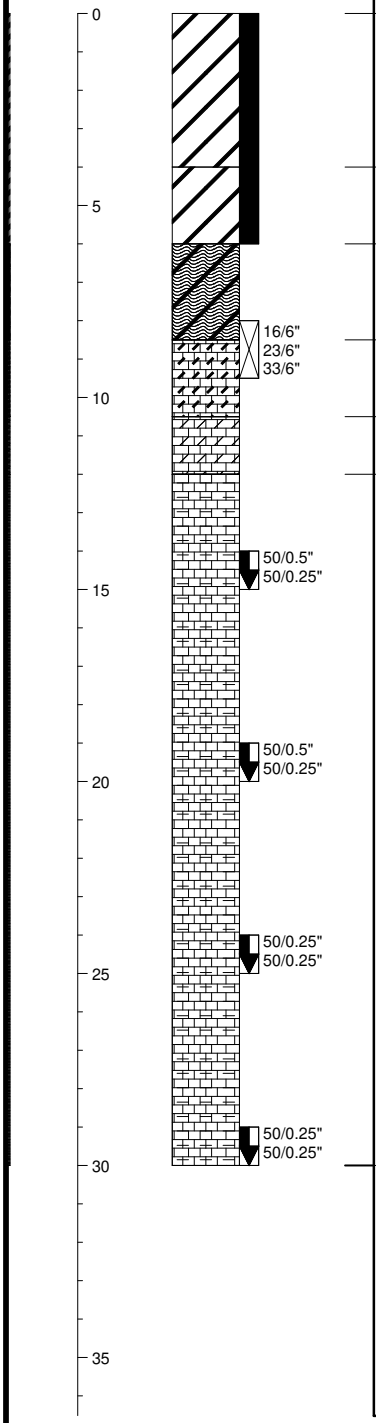
Project: **David W. Carter High School - Dallas, TX** Project No.: **DE23-229**

Date: **2/24/2024** Elev.: Location: **See Figure 1**

Depth to water at completion of boring: **Dry**

Depth to water when checked: was:

Depth to caving when checked: was:



ELEVATION/ DEPTH (feet)	DESCRIPTION	MC %	LL %	PL %	PI %	-200 %	DD pcf	P.PEN tsf	UNCON ksf	Strain %
	Dark brown and brown CLAY, w/ crushed limestone (FILL)	23						4.5		
								3.21		
								3.0		
		33						3.1		
	Dark brown CLAY, jointed, w/ calcareous nodules							3.0		
		35						3.1		
	Tan calcareous CLAY, w/ weathered limeston seams	19	40	21	19		109	4.5++		
								4.5+		
		15						4.5++		
	Firm tan severely weathered LIMESTONE, highly fractured, w/ calcareous clay layers									
	Hard to very hard tan weathered LIMESTONE, fractured, w/ calcareous clay seams									
	Very hard gray shaley LIMESTONE, w/ shale seams									
	Boring terminated at 30 feet									

Notes:

FIGURE:4

KEY TO LOG TERMS & SYMBOLS

Symbol Description

Strata symbols

CLAY

**CLAY,
Calcareous**

**LIMESTONE,
severely
weathered**

**LIMESTONE,
weathered**

Shaley LIMESTONE

Soil Samplers

**Thin Wall
Shelby Tube**

**Standard
Penetration
Test**

Auger

**THD Cone
Penetration
Test**

Notes:

1. Exploratory borings were drilled on dates indicated using truck mounted drilling equipment.

2. Water level observations are noted on boring logs.

3. Results of tests conducted on samples recovered are reported on the boring logs. Abbreviations used are:

DD = natural dry density (pcf)	LL = liquid limit (%)
MC = natural moisture content (%)	PL = plastic limit (%)
Uncon.= unconfined compression (ksf)	PI = plasticity index
P.Pen.= hand penetrometer (tsf)	-200 = percent passing #200

4. Rock Cores
   REC = (Recovery) sum of core sample recovered divided by length of run, expressed as percentage.
   RQD = (Rock Quality Designation) sum of core sample recovery 4" or greater in length divided by the run, expressed as percentage.

FIGURE:5

SWELL TEST RESULTS

BORING NO.	DEPTH (FEET)	UNIT WEIGHT	ATTERBERG LIMITS			IN-SITU MOISTURE CONTENT	FINAL MOISTURE CONTENT	LOAD (PSF)	VERTICAL SWELL %
			LL	PL	PI				
B-1	3-4	93.9	69	24	45	28.8	30.3	438	1.5
B-2	1-2	96.7	59	19	40	27.1	28.8	188	2.1
	7-8	106.8	36	18	18	20.9	21.5	938	0.1
B-3	6-7	108.5	40	21	19	18.9	20.4	813	1.3

PROCEDURE:

1. The subject sample is placed in a confined ring. Then, the design load (including overburden) is applied to the sample.
2. The confined ring with the sample is then submerged with free water with surfactant and allowed to swell completely.
3. Once the swell movement stabilized, the design load was removed and the sample was retrieved for final moisture content determination.

SOLUBLE SULFATES TEST RESULTS (PPM)

BORING NO.	DEPTH (FEET)	SOLUBLE SULFATES (PPM)
B-1	7-8	<100
B-2	9-10	<100
B-3	8-9	<100

ALLIANCE GEOTECHNICAL GROUP	Project No: DE23-229	SOLUBLE SULFATE TEST RESULTS
	DAVID CARTER HIGH SCHOOL DALLAS, TEXAS	FIGURE NO: 7

SECTION 02 22 00 - SITE DEMOLITION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Demolish designated structures and portions of existing facilities.

B. Remove materials from site.

C. Disconnect, cap, and remove identified utilities.

1.2 A. Section 31 05 00: Earthwork.

1.3 REFERENCED STANDARDS

A. American National Standards Institute (ANSI): A10.6: "American National Standard Safety Requirements for Demolition.

1.4 SUBMITTALS

A. Submit demolition and removal procedures, schedule and record documents under provisions of Section 01 33 00 – Submittal Procedures.

1.5 QUALIFICATIONS

A. Demolition Firm: Company specializing in performing the work of this section with minimum 5 years documented experience.

1.6 REGULATORY REQUIREMENTS

A. Conform to applicable codes for demolition of structures, safety of adjacent structures, dust control, runoff control, disposal.

B. Obtain required permits from authorities.

C. Notify affected utility companies before starting work and comply with their requirements.

D. Do not close or obstruct roadways, sidewalks, or hydrants without permits.

E. Conform to applicable regulatory procedures when discovering hazardous or contaminated materials, and when removing such materials from the project site.

1.7 EXISTING CONDITIONS

A. Conduct demolition to minimize interference with adjacent portion of structures to remain.

B. Conduct operations with minimum interference with public usage of buildings. Maintain protected egress and access at all times.

1.8 PROTECTION

A. Take care to ensure that there shall be no damage to elements or portions thereof which are not required to be removed. Erect and maintain temporary shoring, bracing, and other means to safeguard the structural integrity of the existing portions of building and its parts to remain.

B. Erect and maintain temporary bracing, shoring, lights, barricades, signs, and other means to protect the public, workers, and other persons, and finishes and improvements to remain from damage; all in accordance with applicable regulatory requirements.

C. Erect and maintain temporary barriers to confine dust and debris.

D. Protect existing trees to remain. Keep area within the drip line clear of construction traffic, parking, soil contamination, soil stockpiling, storage of materials, debris, and ponding water.

1.9 EXAMINATION OF SITE

A. Before submitting a Bid, Bidders shall visit and examine site to ascertain actual nature and scope of demolition work. Submittal of a Bid shall be taken as evidence that such an examination has been made and various features noted. Later claims for extra compensation on account of additional labor, materials, or equipment required for difficulties encountered in demolition work shall not be recognized.

PART 2 - PRODUCTS

2.1 GENERAL

A. Materials designated for demolition shall become the Contractor's property; remove and dispose of such materials unless otherwise indicated or specified. Sales of salvage materials are not allowed on site.

B. Furnishings and equipment items to remain Owner's property shall be removed by him prior to the start of demolition (or shall be designated on the Drawings herein to be removed and stored by Contractor). Items not so designated shall be considered debris and shall be removed and disposed of accordingly.

C. Carefully disconnect, remove and protect items directed by the Architect to be salvaged.

D. Transport salvaged items to on-site storage areas.

E. Fill Materials: Type specified in Section 31 05 00 - Earthwork.

PART 3 - EXECUTION

3.1 INSPECTIONS

A. Prior to starting demolition, make inspection and report observable defects and structural weaknesses of construction designated for demolition, of adjacent structures, and of improvements to remain. If unsatisfactory conditions exist, do not commence demolition until appropriate determinations have been made.

B. Following demolition, make inspection and report defects and structural weaknesses of items partially demolished, cut, or removed; of adjacent structures; and of improvements remaining.

3.2 PREPARATION

A. Prevent movement or settlement of adjacent structures. Provide bracing, shoring, and underpinning as required.

B. Protect existing appurtenances, structures and landscaping which are not to be demolished.

C. Locate, disconnect, remove, and cap designated utility lines within demolition areas.

D. Mark location of disconnected utilities. Identify utilities and indicate capping locations on Project Record Documents.

3.3 DEMOLITION REQUIREMENTS

A. Conduct demolition to minimize interference with adjacent structures.

B. Cease operations immediately if adjacent structures appear to be in danger. Notify Architect. Do not resume operations until directed.

C. Conduct operations with minimum interference to public or private accesses. Maintain protected egress and access at all times.

D. Obtain written permission from adjacent property owners when demolition equipment shall traverse, infringe upon or limit access to their property.

3.4 DEMOLITION

A. Perform demolition in accordance with ANSI 10.6 and applicable regulatory requirements.

B. Remove items designated for demolition within the limits of work indicated, and as required to perform the work. Do not remove anything beyond the limits of demolition indicated without the prior written approval of Architect. If in doubt whether to remove an item, obtain written approval prior to proceeding.

C. Demolish indicated structures and appurtenances in an orderly and careful manner. Remove materials carefully providing format and structurally sound junctures between new and existing materials. Demolish structures above each floor level before damaging supporting members on lower levels.

D. Upon discovery of hazardous materials (asbestos, P.C.B's, etc.) or if it is suspected that hazardous materials have been encountered, cease work immediately and notify the Architect.

E. Except where noted otherwise, immediately remove demolished material from site.

F. Remove materials to be re-installed or retained in manner to prevent damage. Store and protect under provisions of Section 01 60 00 –Product Requirements.

G. Remove and promptly dispose of contaminated, vermin infested, or dangerous materials encountered.

H. Do not burn or bury materials on site.

I. Remove concrete slabs on grade where designated or as required to produce the intended results.

J. Keep work sprinkled to minimize dust. Provide hoses and watermain or hydrant connections for this purpose.

K. Backfill areas excavated caused as a result of demolition. Use soil and methods specified in Section 31 05 00 - Earthwork.

L. Rough grade and compact areas affected by demolition to maintain site grades and contours. Do not allow water to pond in excavations.

M. Remove demolished materials from site as work progresses. Leave site in clean condition.

N. Demolish concrete in small sections.

O. Do not jackhammer within 2 inches of reinforcing or structural steel to remain; remove final 2 inches of material using chipping guns or suitable hand tools.

P. If in the event hazardous materials (asbestos, PCP's, etc.) are encountered during the course of the demolition work, or if it is even suspected that such materials shall or have been encountered cease work immediately in the affected area and promptly notify Architect.

3.5 CUTTING

A. Make new openings neat, as close as possible to profiles indicated and only to extent necessary for new work.

B. Do not cut or alter structural members unless specifically indicated or approved, and do not damage reinforcing or structural steel to remain.

C. At concrete, masonry, paving, and other materials where edges of cuts and holes shall remain

exposed in the completed work, make cuts using power-sawing and coring equipment. Sawcut full depth of work to be removed for flush exposed face. Do not overcut at corners of cut openings. Provide 6" diameter core cuts at corners of concrete to be sawcut and removed prior to saw cutting.

D. Upon completion of cutting and coring, clean remaining surfaces of loose particles and dust.

3.6 PIPES, DUCTS, AND CONDUITS

A. Remove deactivated mechanical, plumbing, and sprinkler piping, ducts, and electrical conduit, including fastenings, connections, and other related appurtenances and accessories which would otherwise be exposed in the completed work or interfere with construction operations.

B. Cap deactivated piping systems at points of cutoff.

3.7 RECONDITIONING EXISTING SUBSTRATES

A. Clean surfaces on which new materials shall be applied, removing adhesives, bitumen, and other adhering materials, as necessary to furnish acceptable substrates for new materials.

B. Perform sandblasting, chipping, grinding, acid washing, etching, and other work as required by conditions encountered and new materials involved.

C. Use of acids or other cleaning agents shall include neutralizing, washing, rinsing, and drying, as applicable.

D. Determine substrate requirements for reconditioned surfaces in cooperation with the manufacturer's representative and installer of each new material involved.

END OF SECTION 02 22 00

SECTION 02 41 00 - DEMOLITION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes
   1. Salvage of building elements for reuse or return to Owner.
   2. Building demolition excluding removal of hazardous materials and toxic substances.
   3. Selective demolition of built site elements.
   4. Selective demolition of building elements for alteration purposes.
   5. Abandonment and removal of existing utilities and utility structures.

1.3 RELATED REQUIREMENTS

A. Section 00 31 00 - Available Project Information: Existing building survey conducted by Owner; information about known hazardous materials.

B. Section 01 10 00 - Summary of Work: Limitations on Contractor's use of site and premises.

C. Section 01 10 00 - Summary of Work: Sequencing and staging requirements.

D. Section 01 10 00 - Summary of Work: Description of items to be removed by Owner.

E. Section 01 10 00 - Summary of Work: Description of items to be salvaged or removed for re-use by Contractor.

F. Section 01 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

G. Section 01 60 00 - Product Requirements: Handling and storage of items removed for salvage and relocation.

H. Section 01 73 00 - Execution: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

1.4 SUBMITTALS

A. Refer to Section 01 33 00 - Submittal Procedures, for submittal procedures.

B. Site Plan: Showing:
   1. Vegetation to be protected.
   2. Areas for temporary construction and field offices.
   3. Areas for temporary and permanent placement of removed materials.

C. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
   1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences.
   2. Identify demolition firm and submit qualifications.
   3. Include a summary of safety procedures.

D. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

1.5 QUALITY ASSURANCE

A. Demolition Firm Qualifications: Company specializing in the type of work required.
   1. Minimum of 5 years of documented experience.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 SCOPE

A. As indicated on Drawings.

3.2 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with other requirements specified in Section 01 73 00 - Execution.

B. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.
   2. Comply with applicable requirements of NFPA 241.
   3. Use of explosives is not permitted.
   4. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
   5. Provide, erect, and maintain temporary barriers and security devices.
   6. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
   7. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   8. Do not close or obstruct roadways or sidewalks without permit.
   9. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
   10. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

C. Do not begin removal until receipt of notification to proceed from Owner.

D. Do not begin removal until built elements to be salvaged or relocated have been removed.

E. Do not begin removal until vegetation to be relocated has been removed and specified measures have been taken to protect vegetation to remain.

F. Protect existing structures and other elements that are not to be removed.
   1. Provide bracing and shoring.
   2. Prevent movement or settlement of adjacent structures.
   3. Stop work immediately if adjacent structures appear to be in danger.

G. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

H. If hazardous materials are discovered during removal operations, stop work and notify the Architect and the Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.
   1. Hazardous Materials: Comply with 29 CFR 1926 and state and local regulations.

3.3 EXISTING UTILITIES

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

3.4 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as indicated.
   2. Report discrepancies to Architect before disturbing existing installation.
   3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Remove existing work as indicated and as required to accomplish new work.
   1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction.
   2. Remove items indicated on Drawings.

C. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
   2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
   3. Refer to Section 01 10 00 - Summary of Work for other limitations on outages and required notifications.
   4. Verify that abandoned services serve only abandoned facilities before removal.
   5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.

D. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.
   2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.
   4. Patch as specified for patching new work.

3.5 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION 02 41 00

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SECTION 02 82 00 - ASBESTOS REMEDIATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: Requirements including but not limited to:
   1. Asbestos material abatement and disposal.
   2. Accessories necessary for complete removal.

1.3 SUBMITTAL

A. Submit copy of the signed waste manifests indicating the place, time and exact quantity of asbestos, received by an approved landfill.

1.4 QUALITY ASSURANCE

A. Qualifications: Entity having minimum five (5) years documented experience, holding required current licenses for the removal, transport, and disposal and related activities relative to the work, having the required personal protective equipment and respirators for abatement operations, with current liability insurance, and who employs workers fully trained and knowledgeable in the removal of hazardous materials.

B. Stop Asbestos Removal
   1. If a verbal or written Stop Asbestos Removal Order is given, immediately stop asbestos removal and maintain HEPA filtered negative pressure air flow in the containment and adequately wet any exposed ACM.
   2. Do not resume asbestos removal activity until authorized to do so in writing.
   3. A stop asbestos removal order may be issued at any time it is determined that abatement conditions/activities are not within regulatory requirements or that an imminent hazard exists to human health or the environment.
   4. Work stoppage will continue until conditions have been corrected.

PART 2 - MATERIALS

NOT USED

PART 3 - EXECUTION

3.1 REMEDIATION

A. The Owner has conducted an asbestos survey and has determined that asbestos may be present in areas where work will be performed. The survey is made available for review.
   1. As part of the work, Owner requires asbestos removal to be performed under the construction contract.
   2. Asbestos may be present in vinyl tile under architectural woodwork or covered by, but not encapsulated, carpet materials and other types of flooring.
   3. Asbestos may be present in the ductwork above the ceiling panels.

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4. If asbestos is found, stop work in the area and engage an asbestos removal firm to remediate the asbestos from the area. Do not resume work in the affected areas until the abatement is complete and authorization to proceed with work in the affected areas is given. Work in areas not affected by asbestos may continue.

B. Assume responsibility and liability for compliance with applicable Federal, State, and Local regulations related to the asbestos abatement work.
   1. Provide and maintain training, accreditations, medical exams, medical records, personal protective equipment (PPE) including respiratory protection including respirator fit testing, as required by applicable Federal, State and Local regulations.
   2. Post required notices prior to the commencement of the work.
   3. Restrict access to containment areas to authorized, trained, and protected personnel.
   4. Prepare and post an emergency plan in clean room and equipment room of the decontamination unit.
   5. Do not permit workers to eat, drink, smoke, chew gum or tobacco, or break the protection of the respiratory protection system in the work area.

C. Entering and Exiting Procedures: Establish procedures for entering and exiting containment area. Provide personnel decontamination unit with disposable coveralls, head covers, and clean respirators. Provide shower room between personnel decontamination area and equipment room.

D. Decontamination Procedures: Establish procedures for decontamination upon leaving containment are in accordance with federal and state regulations.

E. Provide negative pressure filtration systems to complete exchange air 4 time per hour. Provide standby system in the event of a machine failure or emergency.
   1. Continuously monitor and record the pressure differential between the work area and the building outside of the work area.

F. Prepare the Affected Area: Remove furnishings and materials to the extent necessary to remediate the asbestos.

G. Containment of Areas:
   1. Provide a secure containment work area in accordance with federal and state regulations. Avoid damage to existing partitions and ceilings scheduled to remain to the extent possible.
      a. Establish critical barriers over each opening into the work area.
      b. Close out vents and air ducts to prevent particulates from entering the HVAC system.

H. Debris:
   1. Place contaminated debris in a designated location within the containment area.
      a. Place debris in minimum 6 mil poly bags before removing from contaminated areas. Pass Clean or decontaminate bags and pass and pass through a double 6 mil flap doorway into another bag or fiber drum. Remove to disposal dumpster/gondola/vehicle. Do not permit unprotected personnel to come in contact with contaminated bags.
      b. Remove and dispose of contaminated debris in compliance with local regulations.

I. Testing: Perform required tests and inspections upon completion of the work. Collect air samples and analyze in accordance with regulations. Upon satisfactory conclusion of testing, remove critical barriers.

J. After thorough decontamination, complete asbestos abatement work upon meeting the regulated area clearance criteria and fulfilling the following:
   1. Remove equipment, materials, and debris from the project area.
   2. Package and dispose asbestos waste as required.
   3. Repair or replace all interior finishes damaged during the abatement work.
   4. Fulfill other project closeout requirements as specified elsewhere in this specification.

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3.2 CERTIFICATE OF COMPLETION BY CONTRACTOR

A. Submit a signed Certificate of Completion at the completion of the abatement and decontamination of the regulated area.

END OF SECTION 02 82 00

SECTION 02 83 00 - LEAD REMEDIATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Recognition of lead-based material and its definition.
   2. Federal and state requirement reference.
   3. Contractor’s Liability.
   4. Contractor’s Acknowledgment.

B. Related Sections:
   1. Section 01 35 43 - EPA Lead Based Paint Renovation, Repair and Painting Program..

C. Lead as a Health Hazard:
   1. Lead poisoning is recognized as a serious environmental health hazard facing children today. Even at low levels of exposure - much lower than previously believed - lead can impair the development of a child's central nervous system, causing learning disabilities and leading to serious behavioral problems. Lead enters the environment as tiny lead particles and lead dust disburses when paint chips or chalks peels or wears away over time, or is otherwise disturbed. Ingestion of lead dust is the most common pathway of childhood poisoning; lead dust gets on a child’s hands and toys and then into a child’s mouth through common hand-to-mouth activity. Exposures may result from construction or remodeling activities that disturb lead paint, from ordinary wear and tear of windows and doors, or from friction on other surfaces.
   2. Ordinary construction and renovation or repainting activities carried out without lead-safe work practices can disturb lead-based paint and create significant hazards. Improper removal practices, such as dry scraping, sanding, or water blasting painted surfaces, are likely to generate high volumes of lead dust.
   3. Because Contractor and their employees will be providing services for Owner, and because Contractor's work may disturb lead-containing building materials, Contractor is hereby notified of the potential presence of lead-containing materials located within certain buildings utilized by Owner. All buildings built prior to 1978 are presumed to contain some lead-based paint until sampling proves otherwise.
   4. Refer to “Asbestos and Lead-Based Paint Survey Report – Appendix A” in this Project manual.
   5. OSHA Regulations contain specific and detailed requirements imposed on contractors subject to that regulation. OSHA Regulations define construction work as "work for construction, alteration, and/or repair, including painting and decorating". It includes, but is not limited to, the following:
      a. Demolition or salvage of structures where lead or materials containing lead are present.
      b. Removal or encapsulation of materials containing lead.
      c. New construction, alteration, repair, or renovation of structures, substrates, or portions thereof that contain lead, or materials containing lead.
      d. Installation of products containing lead.
      e. Lead contamination/emergency cleanup.
      f. Transportation, disposal, storage, or containment of lead or materials containing lead on the site or location at which construction activities are performed.
      g. Maintenance operations associated with the construction activities described in Section 01 78 23 - Operation and Maintenance Data, or within this Section.

6. The Contractor shall notify the Owner if any Work may result in the disturbance of lead-containing building materials. Any and all Work that may result in the disturbance of lead-containing building materials shall be coordinated through the Owner. A signed copy of this Certification shall be on file prior to beginning Work on the Project, along with all current insurance certificates.

D. Renovation, Repair, and Painting Rule:
   1. Toxic Substance Control Act Section 402(a):
      a. EPA requires lead safe work practices to reduce exposure to lead hazards created by renovation, repair, and painting activities that disturb lead-based paint. Pursuant to the Renovation, Repair and Painting Rule (RRP), renovations in homes, childcare facilities, and schools built prior to 1978 must be conducted by certified renovations firms, using renovators with training by a EPA-accredited training provider, and fully and adequately complying with all applicable laws, rules, and regulations governing lead-based materials, including those rules and regulations appearing within title 40 of the Code of Federal Regulations as part 745 (40 CFR 745).
      b. The RRP requirements apply to all contractors who disturb lead-based paint in a six (6) square foot or greater area indoors or a 20 square foot or greater area outdoors. If a Department of Public Health certified inspector or risk assessor determines that a structure constructed before 1978 is lead-free, the federal certification is not required for anyone working on that particular building.

1.3 SUBMITTAL

A. Contractor's Acknowledgment (Refer to end of Section).

B. Submit copy of the signed waste manifests indicating the place, time, and exact quantity of material received by an approved landfill.

1.4 CONTRACTOR'S LIABILITY

A. If the Contractor fails to comply with any applicable laws, rules, or regulations, and that failure results in a site or worker contamination, Contractor will be held solely responsible for all costs involved in any required corrective actions, and shall defend, indemnify, and hold harmless the Owner, pursuant to the indemnification provisions of Contract, for all damages and other claims arising therefrom.

B. If lead disturbance is anticipated in the Work, only persons with appropriate accreditation, registrations, licenses, and training shall conduct this Work.

C. It shall be the responsibility of the Contractor to properly dispose of any and all waste products, including, but not limited to, paint chips, any collected residue, or any other visual material that may occur from the prepping of any painted surface. It will be the responsibility of Contractor to provide the proper disposal of any hazardous waste by a certified hazardous waste hauler. This company shall be registered with the Department of Transportation (DOT) and shall be able to issue a current manifest number upon transporting any hazardous material from any Project site.

D. The Contractor shall provide the Owner with any sample results prior to beginning Work, during the Work, and after the completion of the Work. The Owner may request to examine, prior to the commencement of the Work, the lead training records of each employee of Contractor.

PART 2- PRODUCTS

NOT USED

PART 3 EXECUTION

THE CONTRACTOR HEREBY ACKNOWLEDGES UNDER PENALTY OF PERJURY THAT IT:

Has received notification of potential lead-based materials on Owner's property;

Is knowledgeable regarding and will comply with all applicable laws, rules, and regulations governing work with, and disposal of, lead.

UNDERSIGNED WARRANTS THAT THEY HAVE AUTHORITY TO SIGN ON BEHALF OF AND BIND THE CONTRACTOR. THE OWNER MAY REQUIRE PROOF OF SUCH AUTHORITY.

DATE:

PROPER NAME OF THE CONTRACTOR:

SIGNATURE:

PRINT NAME:

TITLE:

PROJECT/CONTRACT NO.: _____ (PROJECT OR CONTRACT) BETWEEN THE OWNER AND _____ (CONTRACTOR OR BIDDER).

THIS CERTIFICATION PROVIDES NOTICE TO THE CONTRACTOR THAT:

The Contractor's work may disturb lead-containing building materials.

The Contractor shall notify the Owner if any work may result in the disturbance of lead-containing building materials.

The Contractor shall comply with the Renovation, Repair, and Painting Rule, if lead-based paint is disturbed in a six (6) square-foot or greater area indoors or a 20-square-foot or greater area outdoors.

END OF SECTION 02 83 00

SECTION 03 10 00 - CONCRETE FORMWORK AND ACCESSORIES

PART 1 – GENERAL

1.1 REFERENCED DOCUMENTS

A. The Conditions of the contract, including the General Conditions and Supplementary Conditions and Division 1 – General Requirements, apply to work specified in this Section.

1.2 DESCRIPTION OF WORK

A. Work Included: Furnish all labor, materials, services, equipment and appliances required in conjunction with the design, fabrication and erection of formwork for cast-in-place concrete complete, including but not limited to, the following:
   1. Wood Forms.
   2. Pan Forms.
   3. Permanent metal forms.
   4. Cardboard Carton Forms (Void Boxes)
   5. Shoring and reshoring.
   6. Installation in formwork of items furnished by other trades.
   7. Construction Joint Bulkheads, Keys, Blockouts, Sleeves, and Post Tensioning Packets.

B. The extent of formwork is indicated by cast-in-place concrete structures shown on the drawings.

C. Related Work Specified in Other Sections:
   1. Forms for Sitework Concrete.

1.3 QUALITY ASSURANCE

A. The latest edition of all standards referenced in this section shall apply, unless noted otherwise.

B. Referenced Standards: American Concrete Institute (ACI); “Recommended Practice for Concrete Formwork” (ACI 347), and SP-4 Formwork for Concrete”.

C. Design of Forms and Falsework: All forms, shores, falsework, bracing and other temporary supports shall be engineered by the Contractor to support all loads imposed during construction, including weight of construction equipment, allowance for live loads, and lateral forces due to wind and temporary imbalance or discontinuity of building components. It is also the Contractor’s responsibility to determine when temporary supports and bracing may be safely removed.

D. Allowable Tolerances: Construct formwork to provide completed cast-in-place concrete surfaces complying with tolerances as follows:

1. Variations from plumb in lines and surfaces of columns, piers, walls and arises: One fourth (1/4) inch in any ten (10) feet of length, but not more than one (1) inch. Exposed corner columns, control-joint grooves, and other conspicuous lines: one-fourth (1/4) inch in any twenty (20) feet length; one half (1/2) inch maximum for entire length.
2. Variations from level or grade in slab soffits, ceilings, beam soffits and in arises; one-fourth (1/4) inch in any ten (10) feet of length; three-eights (3/8) inch in any twenty (20) feet of length; and three-fourths (3/4) inch maximum for entire length. For exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines: one fourth (1/4) inch in any bay or any twenty (20) feet of length; and one-half (1/2) inch maximum for entire length.
3. Variations of distance between walls, columns, partitions and beams: one-fourth (1/4) inch per ten (10) feet of distance, but not more than one-half (1/2) inch in any one bay: and not more than one (1) inch total variation.
4. Variation from position of linear building lines from established position in plans: not more than one (1) inch.
5. Variation in sizes and locations of sleeves, floor openings, and wall openings: minus one-fourth (1/4) inch to plus one-half (1/2) inch.
6. Variation in cross-sectional dimensions of columns and beams and thickness of slabs and walls: minus one-fourth (1/4) inch to plus one-half (1/2) inch.
7. Variation in steps in a flight of stairs: one-eighth (1/8) inch for rise and one-fourth (1/4) inch for treads. In consecutive steps: one-sixteenth (1/16) inch for rise and one-eighth (1/8) inch for treads.
8. Checking Formwork:
   a. Before concrete placement check lines and levels of erected formwork. Make corrections and adjustments to insure proper size and location of concrete members and stability of forming systems.
   b. During concrete placement check formwork and related supports to ensure that forms are not displaced and that completed work will be within specified tolerances.
9. Forming irregularities:
   Class A - Architecturally exposed surfaces: 1/8” abrupt or gradual
   Class B – Surfaces receiving stucco or plaster: ¼” abrupt of gradual
   Class C – Exposed surfaces, unfinished space: ¼” abrupt or ½” gradual
   Class D – Concealed surfaces, unless noted otherwise; 1” abrupt or gradual

1.4 SUBMITTALS

A. Shop Drawings:

1. Architects review will be for general applications and features only. Design of formwork for structural stability and sufficiency is Contractor’s responsibility.
2. In addition to the above, submit Shop Drawings detailing the following, if such systems are called for on the drawings:
   a. Pan type forms.
   b. Column forms.
   c. Slab forms.

d. Permanent forms for columns.
e. Carton Forms, retainers, and related accessories.

B. Product Data:

Submit manufacturers' data and installation instructions for proprietary materials used in exposed concrete work including form liners, release agents, and manufactured form systems and accessories.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle form materials in conformance with manufacturer's printed instructions. Store materials that are subject to damage by the elements, under cover and off the ground.

1.6 JOB CONDITIONS

A. Coordinate formwork with work of other trades. Give other trades ample lead time for installation of their work.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:
   1. Laminated column forms:
      a. Alton Building Products.
      b. Sonoco Products Co.
      c. Consolidated Papers, Inc.
   2. Fiberglass column forms:
      a. The Ceco Corp.
      b. Molded Fiberglass Concrete Forms.
      c. Symons Corp.
      d. Interform.
   3. Pan forms:
      a. The Ceco Corp. (steel and plastic)
      b. Symons Corp. (plastic)
      c. Interform.
   4. Formwork and accessories:
      a. The Burke Co.
      b. Gates and Sons.
      c. Hohmann and Barnard, Inc.
      d. Superior Concrete Accessories, Inc.
      e. Williams Form Engineering Corp.
   5. Cardboard Carton Forms:
      a. Surevoid Products, Inc.

2.2 FORM MATERIALS

A. Forms for Exposed Finish Concrete:
   1. Unless otherwise indicated, construct formwork for exposed concrete surfaces with plywood, metal, metal-framed plywood-faced or other panel type materials to provide as cast surfaces. Furnish in largest sizes to minimize number of joints and to conform to a regular joint pattern. Provide form material with sufficient thickness to withstand pressure of placed concrete without bow or deflection beyond allowable tolerances. Joints shall be made tight and strongly backed so that edges of adjoining formwork will remain flush and true. Unsightly joint marks will not be permitted. Form joints shall be vertical or horizontal, unless otherwise noted.
   2. Wood forms for exposed concrete surfaces indicated to be smooth shall be constructed of Commercial Standard Douglas Fir, moisture-resistant, concrete form plywood, not less than five (5) ply, and at least nine-sixteenths (9/16) inch thick, with one (1) smooth face, or shall be forms with linings of one (1) of the following types:
      a. Plywood: Commercial Standard Douglas Fir, concrete form, exterior three (3) ply, not less than one-fourth (1/4) inch thick, having one (1) smooth face.
      b. Fiberboard: Treated, hard pressed fiberboard having a low degree of water absorptivity, not less than three-sixteenths (3/16) inch thick, with one (1) smooth side.
   3. Cylindrical Forms:
      a. Non-permanent: Form round-section members with fiber tubes constructed or laminated plies, using water-resistant type with wax-impregnated exterior for weather and moisture protection. Provide manufacturer's standard-lined interior units.
   b. Permanent: Form round-section members with permanent steel forms. Finish forms smooth so there is no seam. See architectural drawings for location and other requirements.
   c. Provide forms with sufficient wall thickness to resist loads imposed by fresh concrete without deformation.

B. Forms for Unexposed Concrete Surfaces:
   1. Form concrete surfaces which will be unexposed in finished structure with plywood, lumber, metal, or other acceptable material. Use lumber that is dressed on at least two (2) edges and one (1) side for tight fit.
   2. Wood forms for unexposed concrete surfaces shall be built of No. 2 Common Southern Yellow Pine lumber or other material of equal qualifications (subject to the approval of the Architects), of sufficient thickness to sustain the loads imposed thereon, dressed to uniformly smooth contact surfaces and so constructed as to be readily removable.
   3. Void box forms shall be wax-impregnated cardboard cartons, equal to those manufactured by SureVoid Products Inc. or approved equal. Cover ribs and tops shall be made of corrugated fiberboard capable of sustaining a load of six hundred (600) pounds per square foot, (as evidenced by recorded independent testing laboratory tests). All contact surfaces of void box forms shall be coated with an approved moisture resistant compound, sized as indicated.

C. Pan forms: If shown on the drawings, provide forms for concrete pan-type construction, complete with covers and end enclosures. Design units for easy removal without damaging placed concrete. Block adjoining pan units, if required, to avoid lateral deflection of formwork during concrete placement and compaction. Provide standard or tapered end forms, as shown. Factory fabricate pan forms units to required sizes and shapes, of the following materials:
   1. Steel, free of dents, irregularities, sag and rust.
   2. Glass-fiber reinforced plastic, molded under pressure with matched dies.

D. Forms Ties: Provide factory-fabricated, adjustable length, removable or snap-off metal form ties, designed to prevent deflection, and to prevent spalling concrete surfaces upon removal.
   1. Unless otherwise shown, provide ties so that portion remaining within concrete after removal of exterior parts, are at least one (1) inch from outer concrete surface. Unless otherwise indicated, provide form ties which will leave a hole not larger than one (1) inch diameter in concrete surface.
   2. Form ties fabricated on project site and wire ties are not acceptable.

E. Form Coating: Provide a commercially formulated release agent that will not bond with, stain nor adversely affect concrete surfaces; will not impair subsequent treatment of concrete surfaces requiring bond or adhesion, nor impede wetting of surfaces to be cured with water or curing compounds.

2.3 DESIGN OF FORMWORK

A. The design and engineering of the formwork, as well as its construction, shall be the responsibility of the Contractor. All concrete members shall be adequately shored to safely support all loads and lateral pressures outlined in “Recommended Practice for Concrete Formwork” (ACI 347) without distortion, excessive deflection or other damage. All necessary forms, centering, shores and molds shall be built to conform to the shapes, lines and dimensions of the various members of concrete construction, as shown or scheduled on the drawings. They shall be sufficiently tight and so substantially assembled as to prevent bulging, or the leakage of cement paste. All forms shall be assembled to facilitate their removal without damage to the concrete. Construct forms with such care as to produce concrete surfaces which will not leave unsightly or objectionable form marks in exposed concrete surfaces. Lumber once used as forms shall have all contact surfaces thoroughly cleaned before re-use.

B. Design, erect, support, brace and maintain formwork so that it will safely support vertical and lateral loads that might be applied, until such loads can be supported by concrete structure. Carry vertical and lateral loads to ground by formwork system and in-place construction that has attained adequate strength for that purpose.

C. Design forms and falsework to include assumed values of live load, dead load, weight of moving equipment operated on formwork, ambient temperature, foundation pressures, stresses, lateral stability and other factors pertinent to safety of structure during construction.

D. Design formwork to be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials.

E. Fabricate formwork to prevent leakage of cement paste during concrete placement. Solidly butt joints and provide backup material at joints as required, to prevent leakage and fins.

PART 3 – EXECUTION

3.1 FORM CONSTRUCTION

A. General: Construct forms to sizes, shapes, lines and dimensions shown, and as required to obtain accurate alignment, location, grades, level and plumb work unfinished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages, inserts and other features required, use selected materials to obtain finishes.

B. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete. Kerf wood inserts for forming keyways, reglets, recesses and the like, to prevent swelling and assure ease of removal.

C. Form intersecting planes to provide true, clean-cut corners, with edge grain of plywood not exposed as form of concrete.

D. Faslework: Erect falsework and support, brace and maintain it to safely support vertical, lateral and asymmetrical loads applied, until such loads can be supported by in-place concrete structures.

E. Provide shores and struts with positive means of adjustment, capable of taking up formwork settlement during concrete placing operations, using wedges or jacks or a combination thereof. Provide trussed supports when adequate foundations for shores and struts cannot be secured.

F. Support form facing materials by structural members, spaced sufficiently close to prevent deflection. Fit forms placed in successive units for continuous surfaces, to accurate alignment, free from irregularities and within allowable tolerances. Provide camber in formwork, as required for anticipated deflections due to weight and pressures of fresh concrete and construction loads, for long span members without intermediate supports, and as required by the structural drawings.

1. Carefully inspect falsework and formwork during and after concrete placement operations, to determine abnormal deflection or signs of failure; make necessary adjustments to produce work of required dimension.

G. Forms for Exposed Concrete: Drill forms from contact face to outside, to suit ties used and to prevent leakage of concrete mortar around tie holes. Do not splinter forms by driving ties through improperly prepared holes.

1. Do not use metal cover plates for patching holes or defects in forms.
2. Provide sharp, clean corners at intersection planes, without visible edges of offsets. Back joints with extra studs or girts to maintain true, square intersections.
3. Use extra studs, walers, and bracing to prevent bowing of forms between studs and to avoid bowed appearance in concrete. Do not use narrow strips which will produce bow for form material.
4. Assemble forms so they may be readily removed without damage to exposed concrete surfaces.
5. Form molding shapes, recesses and projections with smooth-finish materials, and install in forms with sealed joints to prevent displacement.
6. Locate form ties in level horizontal row, plumbed vertically, and in symmetrical arrangement with openings, unless otherwise noted.

H. Corner Treatment: Form exposed corners of beams and columns to produce square, smooth, solid, unbroken lines, except as otherwise indicated.
1. Form chamfers with 3/4” x 3/4” strips, unless otherwise indicated, accurately formed and surfaced to produce uniformly straight lines and tight edge joints. Extend terminal edges to required limit and miter chamfer at changes in direction.
2. Unexposed corners may be formed either square or chamfered.

I. Control Joints: see “Cast-in-Place Concrete” section for treatment of control and construction joints, including wood screeds, metal keyways and saw cuts. Locate as indicated.

J. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades, including those under separate prime contracts (if any). Size and location of openings, recesses, and chases are responsibility of trade requiring such items. Accurately place and securely support items to be built into forms.

K. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is to be placed. Re-tighten forms after concrete placement if required to eliminate leaks.

3.2 FORM COATINGS

A. Coat form contact surfaces with form release agent before reinforcement is placed. Do not allow excess material to accumulate in forms or to come into contact with reinforcement or surfaces which will be bonded to fresh concrete. Apply in compliance with manufacturer’s instructions.

B. Coat steel forms with non-staining, rust preventive release agent or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

3.3 INSTALLATION OF EMBEDDED ITEMS

A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting

drawings, diagrams, instructions and directions provided by suppliers of items to be attached.

3.4 SHORES AND SUPPORTS

A. Comply with ACI 347, for shoring and reshoring in multi-story construction, and as herein specified.

B. Extend shoring under floor or roof being placed to below Ground Level floor. Shore floor directly under floor or roof being placed, so that loads from construction above will transfer directly to these shores. Space out shoring in stories below this level in such a manner that no floor member will be excessively loaded. Extend shores beyond minimum if required to insure proper distribution of loads throughout structure.

C. Remove shores and reshore in a planned sequence to avoid damage to partially cured concrete. Locate and provide adequate reshoring to safely support work without excessive stress or deflection.

D. Keep reshores in place fifteen (15) days minimum after placing upper tier, and longer if required, until concrete has attained its required twenty-eight (28) day strength and heavy loads due to construction operations have been removed.

3.5 REMOVAL OF FORMS

A. Formwork not supporting concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at on less than 50 degrees Fahrenheit (10 degrees Celcius) for forty-eight (48) hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided that curing and protection operations are maintained.

B. Formwork supporting weight of concrete, such as beam soffits, joist, slabs and other structural elements, may not be removed until concrete has attained the following percentages of the design minimum twenty-eight (28) day compressive strength:

Joist pans and beam bottoms (if shored)	75%
Flat slabs (if shored)	75%
Shoring for floor system	85%

C. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members, as specified in concrete work sections.

D. In the absence of strength tests and under normal conditions, the minimum curing period prior to form removal shall be as follows:

Above Temperature	50F to 60F	40F to 60F	Less than 50F	40F
Side Forms of Beams & Walls & Columns	2 days	2 days	3 days	See Note Below
Bottom Forms of Slabs *	7 days	7 days	10 days	
Bottom Shores Of Beam & Joists	14 days	18days	21 days	

* For slabs spanning more than six (6) feet, add one (1) day for each two (2) additional feet, or fraction thereof.

Note*: When temperatures below 40 degrees Fahrenheit prevails, the forms shall remain in place an additional period equal to the time the structure has been exposed to such lower temperature.

E. Observance of the minimum curing periods listed above does not relieve the Contractor of the responsibility for the safety of the structure during construction.

F. All beams, joists, and slab required to support future construction shall be reshored. Reshores must be plumb and special care should be taken in installation of wedges or jacks to insure concentric loading. Operations shall be performed so that at no time will large areas of new construction be required to support their own weight. The forms shall be removed from one beam at a time and the beam should be reshored before any other supports are removed from one bay of joists and rehired before any other supports are removed. Reshores shall be located in the same position on each floor so that they will be continuous in their support from floor to floor.

G. Wood forms shall be completely removed from under floors, ramps, steps and similar places (through temporary openings, if necessary) in order that no material will be left to rot or to be infested by insects. Exercise care, in the removal of any form, to avoid damaging concrete surfaces.

3.6 REUSE OF FORM

A. Clean and repair surfaces of forms to be reused in work. Split, frayed, delaminated or otherwise damaged from facing material will or be acceptable. Apply new form release agent material to concrete contact surfaces as specified for new formwork.

B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joints to avoid offsets. Do not use “patched” forms for exposed concrete surfaces, except as acceptable to Architect.

3.7 CLEANUP

A. Clean up all debris caused by the work of this Section, keeping the area clean and neat at all times.

END OF SECTION 03 10 00

SECTION 03 20 00 - CONCRETE REINFORCEMENT

PART 1 – GENERAL

1. RELATED DOCUMENTS

   A. Drawings, Bidding Requirements, Contract Forms, Conditions of the Contract and Division 1 – General Requirements apply to the work of this section.

1.1 DESCRIPTION OF WORK

   A. Furnish all labor, materials, tools, equipment and related items required to fabricate and place reinforcement for cast-in-place concrete, including bars, welded wire fabric, ties and bar supports.

   B. Related work specified in other sections:
      1. Testing Laboratory Services – Section 01 40 00
      2. Concrete Formwork – Section 03 10 00
      3. Cast-in-Place Concrete – Section 03 30 00

2.1 QUALITY ASSURANCE

   A. Reference Standards (latest edition):
      1. ACI 301, Specifications for Structural Concrete for Buildings
      2. ACI 318, Building Code Requirements for Reinforced Concrete
      3. ASTM A615, Specification for Deformed Billet Steel Bars for Concrete.
      4. ASTM A185, Specifications for Welded Steel Wire Fabric for Concrete Reinforcement.
      5. Concrete Reinforcing Steel Institute, Manual of Standard Practice.
      6. “Details and Detailing of Concrete Reinforcement”, ACI 315

   B. Allowable Tolerances:
      1. Fabricating:
         a. Sheared length: Plus or minus 1”
         b. Stirrups and ties: Plus or minus 1/2”.
         c. Members more than 8” but not over 2’-0” deep: Plus or minus 1/2”.
         d. Members more than 2’-0” deep: Plus or minus 1”.
         e. Crosswise of members: Space evenly within 2” of stated separation.
         f. Lengthwise of members: Plus or minus 2”.
      2. Maximum bar relocation to avoid interference with other reinforcing steel, conduits or other embedded item: 1 bar diameter.

   C. Testing Laboratory Services

3.1 SUBMITTALS

A. Shop Drawings: Include complete bending diagrams, assembly diagrams, splicing and laps, and rods, shapes, dimensions and details of bar reinforcing and accessories.
   1. Show diagrammatic elevations of walls at scale large enough to clearly show position and erection marks of marginal bars, around openings, dowels, splices, etc., for these bars.
   2. Show complete layout plan for each layer of reinforcing of structural slabs and beams showing number, arrangement, spacing, location, marking, orientation, etc., of reinforcement required for layer being described.

4.1 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver reinforcement to project site in bundles marked with metal tags indicating bar size, length and mark.

B. Unload reinforcing carefully to prevent damage. Store above ground in dry, well drained area; protect from mud, dirt and corrosion.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Reinforcing Bars: ASTM A615, deformed billet steel bars, domestic manufacture, Grades 60 and/or 75 as indicated on structural drawings.

B. Welded Wire Fabric Reinforcing: ASTM A185, domestic manufacture, steel wire spot welded at intersections and of size indicated. Furnish in flat sheets, not rolls.

C. Metal Accessories: Include spacers, chairs, bolsters, ties and other devices necessary for properly placing, spacing, supporting and fastening reinforcement in place, conforming to requirements to CRSI “Manual of Standard Practice for Detailing Reinforced Concrete Structures”. Metal accessories shall be galvanized where legs will be exposed in finished concrete surfaces.

D. Tie Wire: FS QQ-W-461, black enameled steel, 16 ga. min.

E. Reinforcing bars to be welded: ASTM A706, “Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.”

2.2 FABRICATION

A. In accordance with CRSI “Manual of Standard Practice”.

PART 3 – EXECUTION

3.1 PREPARATION

A. Cleaning: Before placing in work, thoroughly clean reinforcement of loose rust, mill scale, dirt, oil and other coating which might tend to reduce bonding. Reinspect reinforcing left protruding for future bonding, or following delay in work, and reclean if necessary.

3.2 INSTALLATION

A. Bar Placement: In accordance with ACI 301, ACI 318 and CRSI “Manual for Standard Practice”
   1. Bending: Bend bars cold; do not heat reinforcing or bend by makeshift methods. Discard bent, kinked or otherwise damaged bars.
   2. Splices: In accordance with ACI 301 and ACI 318.

B. Wire Fabric Placement:
   1. Install in longest practicable length.
   2. Do not make end laps midway between supporting beams, or directly over beams of continuous structures.
   3. Offset end laps in adjacent widths to prevent continuous lap.
   4. Keep wire in proper position during concrete placement.
   5. All wire fabric shall be delivered in flat sheets, not rolled.

END OF SECTION 03 20 00

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site or location or method as mutually agreed upon.
    1. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
        a. Contractor's superintendent.
        b. Independent testing agency responsible for concrete design mixtures.
        c. Ready-mix concrete manufacturer.
        d. Concrete Subcontractor.
        e. Special concrete finish Subcontractor.
    2. Review the following:
        a. Special inspection and testing and inspecting agency procedures for field quality control.
        b. Construction joints, control joints, isolation joints, and joint-filler strips.
        c. Semirigid joint fillers.
        d. Vapor-retarder installation.
        e. Anchor rod and anchorage device installation tolerances.
        f. Cold and hot weather concreting procedures.
        g. Concrete finishes and finishing.
        h. Curing procedures.
        i. Methods for achieving specified floor and slab flatness and levelness.
        j. Floor and slab flatness and levelness measurements.
        k. Concrete repair procedures.
        l. Concrete protection.
        m. Initial curing and field curing of field test cylinders (ASTM C31.)
        n. Protection of field cured field test cylinders.

1.3 ACTION SUBMITTALS

A. Product Data: For each of the following.
    1. Portland cement.
    2. Fly ash.
    3. Slag cement.
    4. Blended hydraulic cement.
    5. Silica fume.
    6. Performance-based hydraulic cement
    7. Aggregates.
    8. Admixtures:
        a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.

9. Color pigments.
10. Fiber reinforcement.
11. Vapor retarders.
12. Floor and slab treatments.
13. Liquid floor treatments.
14. Curing materials.
    a. Include documentation from color pigment manufacturer, indicating that proposed methods of curing are recommended by color pigment manufacturer.
15. Joint fillers.
16. Repair materials.

B. Design Mixtures: For each concrete mixture, include the following:
1. Mixture identification.
2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum w/cm.
5. Calculated equilibrium unit weight, for lightweight concrete.
6. Air content.
7. Nominal maximum aggregate size.
8. Steel-fiber reinforcement content.
9. Synthetic micro-fiber content.
10. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
11. Intended placement method.
12. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Shop Drawings:
1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
    a. Location of construction joints is subject to approval of the Architect.

D. Samples: As indicated on structural drawings.

E. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:
1. Concrete Class designation.
2. Location within Project.
3. Exposure Class designation.
4. Formed Surface Finish designation and final finish.
5. Final finish for floors.
6. Curing process.
7. Floor treatment if any.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:
1. Installer: Include copies of applicable ACI certificates.
2. Ready-mixed concrete manufacturer.

B. Material Certificates: For each of the following, signed by manufacturers:
1. Cementitious materials.
2. Admixtures.
3. Fiber reinforcement.

4. Curing compounds.
5. Floor and slab treatments.
6. Bonding agents.
7. Adhesives.
8. Vapor retarders.
9. Semirigid joint filler.
10. Joint-filler strips.
11. Repair materials.

C. Material Test Reports: For the following, from a qualified testing agency:
1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Blended hydraulic cement.
5. Silica fume.
6. Performance-based hydraulic cement.
7. Aggregates.
8. Admixtures:

D. Floor surface flatness and levelness measurements report, indicating compliance with specified tolerances.

E. Research Reports:
1. For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.
2. For sheet vapor retarder/termite barrier, showing compliance with ICC AC380.

F. Preconstruction Test Reports: For each mix design.

G. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs Project personnel qualified as an ACI-certified Flatwork Technician and Finisher and a supervisor who is a certified ACI Flatwork Concrete Finisher/Technician or an ACI Concrete Flatwork Technician.
1. Post-Installed Concrete Anchors Installers: ACI-certified Adhesive Anchor Installer.

B. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready- mixed concrete products and that complies with ASTM C94 requirements for production facilities and equipment.
1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Laboratory Testing Agency Qualifications: A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated and employing an ACI-certified Concrete Quality Control Technical Manager.

D. Mockups: Cast concrete slab-on-ground and formed-surface panels to demonstrate typical joints, surface finish, texture, tolerances, floor treatments, and standard of workmanship as required by and directed by Architect.
1. Build panel approximately 200 square feet for slab-on-ground and 100 square feet for formed surface in the location indicated by Architect.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on each concrete mixture.
   1. Include the following information in each test report:
      a. Admixture dosage rates.
      b. Slump.
      c. Air content.
      d. Seven-day compressive strength.
      e. 28-day compressive strength.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with ASTM C94 and ACI 301.

1.8 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1 and as follows.
   1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
   2. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
   3. Do not use frozen materials or materials containing ice or snow.
   4. Do not place concrete in contact with surfaces less than 35 deg F, other than reinforcing steel.
   5. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:
   1. Maintain concrete temperature at time of discharge to not exceed 95 deg F. If ice is used to control temperature, use water equivalent of ice to calculate total amount of mixing water.
   2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

A. Cementitious Materials:
   1. Portland Cement: ASTM C150, as indicated on Structural Drawings.
   2. Fly Ash: ASTM C618, Class C or F. Carbon content shall not exceed 3 percent.
   3. Slag Cement: ASTM C989, Grade 100 or 120.
   4. Blended Hydraulic Cement: ASTM C595, as indicated on Structural Drawings.
   5. Silica Fume: ASTM C1240 amorphous silica.

B. Normal-Weight Aggregates: ASTM C33, coarse aggregate or better, graded as indicated on Structural Drawings.
   1. Alkali-Silica Reaction: Comply with one of the following:

a. Expansion Result of Aggregate: Not more than 0.04 percent at one-year when tested in accordance with ASTM C1293.
b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567.
c. Alkali Content in Concrete: Not more than 4 lb./cu. yd. for moderately reactive aggregate or 3 lb./cu. yd. for highly reactive aggregate, when tested in accordance with ASTM C1293 and categorized in accordance with ASTM C1778, based on alkali content being calculated in accordance with ACI 301.

2. Maximum Coarse-Aggregate Size: As indicated on Structural Drawings.
3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Lightweight Aggregate: ASTM C330, As indicated on Structural Drawings.

D. Air-Entraining Admixture: ASTM C260.

E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
1. Water-Reducing Admixture: ASTM C494, Type A.
2. Retarding Admixture: ASTM C494, Type B.
3. Water-Reducing and -Retarding Admixture: ASTM C494, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494, Type F.
5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494, Type G.
6. Plasticizing and Retarding Admixture: ASTM C1017, Type II.

F. Color Pigment: ASTM C979, synthetic mineral-oxide pigments, color stable, nonfading, and resistant to lime and other alkalis.
1. Color: As selected by Architect from manufacturer's full range.

G. Water and Water Used to Make Ice: ASTM C94, potable.

2.3 FIBER REINFORCEMENT

A. Synthetic Monofilament Micro-Fiber: Monofilament polypropylene micro-fibers engineered and designed for use in concrete, complying with ASTM C1116/C1116M, Type III, 1/2 to 1-1/2 inches long.
B. Synthetic Fibrillated Micro-Fiber: Fibrillated polypropylene micro-fibers engineered and designed for use in concrete, complying with ASTM C1116/C1116M, Type III, 1 to 2-1/4 inches long.

2.4 VAPOR RETARDERS

A. Sheet Vapor Retarder, Class A: ASTM E1745, Class A, except with maximum water-vapor permeance of less than 0.1 perms; not less than 15 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.

2.5 FLOOR AND SLAB TREATMENTS

A. Slip-Resistive Emery Aggregate Finish: Factory-graded, packaged, rustproof, non-glazing, abrasive, crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than
20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials with 100 percent passing No. 8 sieve.

2.6 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.
   1. Color:
      a. Ambient Temperature Below 50 deg F: Black.
      b. Ambient Temperature between 50 deg F and 85 deg F: Any color.
      c. Ambient Temperature Above 85 deg F: White.

D. Water: Potable or complying with ASTM C1602.

E. Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C309, Type 1, Class B with a VOC content of 200g/L or less.

2.7 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber or ASTM D1752, cork or self-expanding cork.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 in accordance with ASTM D2240.

C. Bonding Agent: ASTM C1059, Type II, non-re-dispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade and class to suit requirements, and as follows:
   1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

E. Floor Slab Protective Covering: 8-feet- wide cellulose fabric.

2.8 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
   1. Cement Binder: ASTM C150/C150M Portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
   2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
   3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand, as recommended by underlayment manufacturer.
   4. Compressive Strength: Not less than 4100 psi at 28 days when tested in accordance with ASTM C109.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be

applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C150 Portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested in accordance with ASTM C109.

2.9 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.
   1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as indicated in Structural Drawings.

C. Admixtures: Use admixtures in accordance with manufacturer's written instructions. Water soluble chloride ions exceeding 0.01 percent by weight of cement are not permitted.

D. Color Pigment: Add color pigment to concrete mixture in accordance with manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

E. Limit water-soluble chloride ion content in hardened concrete to 0.15 percent by weight of cement.

2.10 CONCRETE MIXTURES

A. Proportion concrete mixture as indicated in Structural Drawings.

2.11 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94 and ASTM C1116 and furnish batch ticket information.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:
   1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
   2. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:
   1. Daily access to the Work.
   2. Incidental labor and facilities necessary to facilitate tests and inspections.
   3. Secure space for storage, initial curing, and field curing of test samples, including source

of water and continuous electrical power at Project site during site curing period for test samples.

4. Security and protection for test samples and for testing and inspection equipment at Project site.

3.3 INSTALLATION OF EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI.
3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is indicated at lintels, shelf angles, and other conditions.

3.4 INSTALLATION OF VAPOR RETARDER

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.

1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
2. Face laps away from exposed direction of concrete pour.
3. Lap vapor retarder over footings and grade beams not less than 6 inches, sealing vapor retarder to concrete.
4. Lap joints 6 inches and seal with manufacturer's recommended tape.
5. Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
6. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
7. Protect vapor retarder during placement of reinforcement and concrete.
    a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches on all sides, and sealing to vapor retarder.

3.5 JOINTS

A. Construct joints true to line, with faces perpendicular to surface plane of concrete.

B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.

1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.
2. Place joints perpendicular to main reinforcement.
    a. Continue reinforcement across construction joints unless otherwise indicated.
3. Space vertical joints in walls as indicated on Drawings.
4. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
5. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth indicated on Structural Drawings as follows:

1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.

2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut joints as indicated on Structural Drawings into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.

D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface, where joint sealants are specified or indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints:
1. Install dowel bars and support assemblies at joints where indicated on Drawings.
2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.
1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.

B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301, but not to exceed the amount indicated on the concrete delivery ticket.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.
1. If a section cannot be placed continuously, provide construction joints as indicated.
2. Deposit concrete to avoid segregation.
3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.
    a. Do not use vibrators to transport concrete inside forms.
    b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
    c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
    d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
   1. Do not place concrete floors and slabs in a checkerboard sequence.
   2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
   3. Maintain reinforcement in position on chairs during concrete placement.
   4. Screed slab surfaces with a straightedge and strike off to correct elevations.
   5. Level concrete, cut high areas, and fill low areas.
   6. Slope surfaces uniformly to drains where required.
   7. Begin initial floating using bull floats or derbies to form a uniform and open-textured surface plane before excess bleed water appears on the surface.
   8. Do not further disturb slab surfaces before starting finishing operations.

3.7 FINISHING FORMED SURFACES

A. As-Cast Surface Finishes:
   1. ACI 301 Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.
      a. Patch voids larger than 1-1/2 inches wide or 1/2 inch deep.
      b. Remove projections larger than 1 inch.
      c. Tie holes do not require patching.
      d. Surface Tolerance: ACI 117 Class D.
      e. Apply to concrete surfaces not exposed to public view.

   2. ACI 301Surface Finish SF-2.0: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.
      a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
      b. Remove projections larger than 1/4 inch.
      c. Patch tie holes.
      d. Surface Tolerance: ACI 117 Class B.
      e. Locations: Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.

   3. ACI 301 Surface Finish SF-3.0:
      a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
      b. Remove projections larger than 1/8 inch.
      c. Patch tie holes.
      d. Surface Tolerance: ACI 117 Class A.
      e. Locations: Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.

B. Rubbed Finish: Apply the following to as cast surface finishes where indicated on Drawings:
   1. Smooth-Rubbed Finish:
      a. Perform no later than one day after form removal.
      b. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture.
      c. If sufficient cement paste cannot be drawn from the concrete by the rubbing process, use a grout made from the same cementitious materials used in the in-place concrete.
      d. Maintain required patterns or variances as indicated on Drawings or to match design reference sample.

C. Related Unformed Surfaces:

1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 FINISHING FLOORS AND SLABS

A. Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish:
1. While still plastic, texture concrete surface that has been screeded and bull-floated or darbied.
2. Use stiff brushes, brooms, or rakes to produce a profile depth of 1/4 inch in one direction.
3. Apply scratch finish to surfaces to receive concrete floor toppings or to receive mortar setting beds for bonded cementitious floor finishes.

C. Float Finish:
1. When bleed water sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power- driven floats or by hand floating if area is small or inaccessible to power-driven floats.
2. Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.
3. Apply float finish to surfaces indicated on Drawings and/or to receive trowel finish or to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand- bed terrazzo.

D. Trowel Finish:
1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface.
5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
6. Apply a trowel finish to surfaces indicated on Drawings and/or exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
7. Finish surfaces to the following tolerances, in accordance with ASTM E1155, for a randomly trafficked floor surface:
    a. Slabs on Ground:
        1) Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.-long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch in 2 feet.
        2) Specified overall values of flatness, FF 25; and of levelness, FL 20; with minimum local values of flatness, FF 17; and of levelness, FL 15.
        3) Specified Overall Value (SOV): FF 50 and FL 25 with minimum local value (MLV): FF 40 and FL 17.

b. Suspended Slabs:
   1) Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.-long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch in 2 feet.
   2) Specified overall values of flatness, FF 25; and of levelness, FL 20; with minimum local values of flatness, FF 17; and of levelness, FL 15.
   3) Specified overall values of flatness, FF 35; and of levelness, FL 20; with minimum local values of flatness, FF 24; and of levelness, FL 15.
   4) Specified overall values of flatness, FF 45; and of levelness, FL 35; with minimum local values of flatness, FF 30; and of levelness, FL 24.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated on Drawings, or where ceramic or quarry tile is to be installed by either thickset or thin set method. While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.
   1. Coordinate required final finish with Architect before application.
   2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.
   1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber- bristle broom perpendicular to main traffic route.
   2. Coordinate required final finish with Architect before application.

G. Slip-Resistive Finish: Before final floating, apply slip-resistive granule finish to concrete stair treads, platforms, ramps as indicated on Drawings.
   1. Apply in accordance with manufacturer's written instructions and as follows:
      a. Uniformly spread 25 lb/100 sq. ft. of dampened slip-resistive granules over surface in one or two applications.
      b. Tamp aggregate flush with surface, but do not force below surface.
      c. After broadcasting and tamping, apply float finish.
      d. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate.

H. Dry-Shake Floor Hardener Finish: After initial floating, apply dry-shake floor hardener to surfaces in accordance with manufacturer's written instructions where indicated on Drawings and as follows:
   1. Uniformly apply dry-shake floor hardener at a rate of 100 lb/100 sq. ft. unless greater amount is recommended by manufacturer.
   2. Uniformly distribute approximately two-thirds of dry-shake floor hardener over surface by hand or with mechanical spreader and embed by power floating.
   3. Follow power floating with a second dry-shake floor hardener application, uniformly distributing remainder of material, and embed by power floating.
   4. After final floating, apply a trowel finish.
   5. Cure concrete with curing compound recommended by dry-shake floor hardener manufacturer and apply immediately after final finishing.

3.9 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

A. Filling In:
   1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
   2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
   3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as indicated on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items.
   1. Cast-in inserts and accessories, as indicated on Drawings.
   2. Screed, tamp, and trowel finish concrete surfaces.

3.10 CONCRETE CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
   1. Comply with ACI 301 and ACI 306.1 for cold weather protection during curing.
   2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.
   3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h, calculated in accordance with ACI 305.1,) before and during finishing operations.
   4. Duration of curing: Curing shall continue until cumulative number of days or fraction, not necessarily consecutive, during which temperature of air in contact with concrete is above 55 degrees F has totaled 7 days.

B. Curing Formed Surfaces: Comply with ACI 308.1 as follows:
   1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
   2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
   3. If forms remain during curing period, moist cure after loosening forms.
   4. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:
      a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
      b. Continuous Sprinkling: Maintain concrete surface continuously wet.
      c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
      d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
      e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
         1) Recoat areas subject to heavy rainfall within three hours after initial application.
         2) Maintain continuity of coating and repair damage during curing period.
         3) Do not use on surfaces against which additional concrete or other cementitious finishing materials are to be bonded, over surfaces to receive waterproofing, or on surfaces on which curing compound is prohibited by Specifications.

C. Curing Unformed Surfaces: Comply with ACI 308.1 as follows:
   1. Begin curing immediately after finishing concrete.
   2. Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
      a. Lap edges and ends of absorptive cover not less than 12-inches.

b. Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

3. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.
   a. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
   b. Cure for not less than seven days.
4. Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
   a. Water.
   b. Continuous water-fog spray.
5. Curing Compound:
   a. Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
   b. Recoat areas subjected to heavy rainfall within three hours after initial application.
   c. Maintain continuity of coating, and repair damage during curing period.
   d. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer, unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.
6. Floors to Receive Curing and Sealing Compound:
   a. Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.
   b. Recoat areas subjected to heavy rainfall within three hours after initial application.
   c. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

3.11 TOLERANCES

A. Conform to ACI 117.

3.12 APPLICATION OF LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment in accordance with manufacturer's written instructions.
   1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
   2. Do not apply to concrete that is less than 28 days' old.
   3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing.
   4. Rinse with water; remove excess material until surface is dry.
   5. Apply a second coat in a similar manner if surface is rough or porous.

B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller in accordance with manufacturer's written instructions.

3.13 JOINT FILLING

A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.
   1. Defer joint filling until concrete has aged at least six month(s).
   2. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint, and trim joint filler flush with top of joint after hardening.

3.14 CONCRETE SURFACE REPAIRS

A. Defective Concrete:
   1. Repair and patch defective areas when approved by Architect.
   2. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry pack patching mortar, consisting of 1 part Portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
   1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete.
      a. Limit cut depth to 3/4 inch.
      b. Make edges of cuts perpendicular to concrete surface.
      c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
      d. Fill and compact with patching mortar before bonding agent has dried.
      e. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
   2. Repair defects on surfaces exposed to view by blending white Portland cement and standard Portland cement, so that, when dry, patching mortar matches surrounding color.
      a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
      b. Compact mortar in place and strike off slightly higher than surrounding surface.
   3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces:
   1. Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
   2. Repair finished surfaces containing surface defects, including spalls, popouts, honeycombs, rock pockets, crazing, and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
   3. After concrete has cured at least 14 days, correct high areas by grinding.
   4. Correct localized low areas during, or immediately after, completing surface-finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
   5. Correct other low areas scheduled to receive floor coverings with a repair underlayment.
      a. Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
      b. Feather edges to match adjacent floor elevations.
   6. Correct other low areas scheduled to remain exposed with repair topping.
      a. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match

adjacent floor elevations.

b. Prepare, mix, and apply repair topping and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

7. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete.
   a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch clearance all around.
   b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
   c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.
   d. Place, compact, and finish to blend with adjacent finished concrete.
   e. Cure in same manner as adjacent concrete.
8. Repair random cracks and single holes 1 inch or less in diameter with patching mortar.
   a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.
   b. Dampen cleaned concrete surfaces and apply bonding agent.
   c. Place patching mortar before bonding agent has dried.
   d. Compact patching mortar and finish to match adjacent concrete.
   e. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.15 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.

B. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
1. The testing agency shall be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31.
2. Testing agency shall immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
3. Testing agency shall report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.
   a. Test reports shall include reporting requirements of ASTM C31, ASTM C39, and ACI 301, including the following as applicable to each test and inspection:
      1) Project name.
      2) Name of testing agency.
      3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
      4) Name of concrete manufacturer.
      5) Date and time of inspection, sampling, and field testing.
      6) Date and time of concrete placement.
      7) Location in Work of concrete represented by samples.
      8) Date and time sample was obtained.
      9) Truck and batch ticket numbers.

10) Design compressive strength at 28 days.
11) Concrete mixture designation, proportions, and materials.
12) Field test results.
13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
14) Type of fracture and compressive break strengths at seven days and 28 days.

C. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, and amount of water that can be added at Project site.

D. Inspections: As indicated on Structural Drawings.

E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172 shall be performed in accordance with the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 100 cu. yd. or fraction thereof.
a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Air Content: ASTM C231 pressure method, for normal-weight concrete; ASTM C173 volumetric method, for structural lightweight concrete.
a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
3. Concrete Temperature: ASTM C1064:
a. One test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
4. Unit Weight: ASTM C567 fresh unit weight of structural lightweight concrete.
a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
5. Compression Test Specimens: ASTM C31:
a. Cast and laboratory cure two sets of two 6-inch by 12-inch cylinder specimens for each composite sample.
b. Cast, initial cure, and field cure additional standard cylinder specimens as required for determination of concrete strength for form removal, stressing of post-tension tendons, etc.
6. Compressive-Strength Tests: ASTM C39.
a. Test one set of two laboratory-cured specimens at seven days and one set of two specimens at 28 days.
b. Test one set of field-cured specimens at age required for form removal and/or stressing of post-tension tendons.
c. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
7. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi if specified compressive strength is 5000 psi less, or no compressive strength test value is less than 10 percent of specified compressive

strength if specified compressive strength is greater than 5000 psi.

9. Nondestructive Testing: Impact hammer, sono-scope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
10. Additional Tests:
    a. Testing and inspecting agency shall make additional tests of concrete when test results indicate that, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
    b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42 or by other methods as directed by Architect.
        1) Acceptance criteria for concrete strength shall be in accordance with ACI 301.
11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
12. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

F. Measure floor and slab flatness and levelness in accordance with ASTM E1155 within 48 hours of completion of floor finishing and promptly report test results to Architect.

3.16 PROTECTION

A. Protect concrete surfaces as follows:
1. Protect from petroleum stains.
2. Diaper hydraulic equipment used over concrete surfaces.
3. Prohibit vehicles from interior concrete slabs.
4. Prohibit use of pipe-cutting machinery over concrete surfaces.
5. Prohibit placement of steel items on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.
7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

END OF SECTION 03 30 00

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings, Bidding Requirements, Contract Forms, Conditions of the Contract and Division 1 – General Requirements apply to the work of this section.

1.02 DESCRIPTION OF THE WORK

A. Work Included: Furnish all labor, materials, tools, equipment and related items required for the following:
   1. Furnish and place cast-in-place concrete.
   2. Grouting structural steel.
   3. Finishing and curing concrete.
   4. Furnish concrete for drilled piers.
   5. Concrete mix designs.
   6. Laboratory testing of concrete.

B. Related work specified in other sections:
   1. Testing Laboratory Services
   2. Drilled Piers – Section 31 63 29
   3. Concrete Formwork – Section 03 10 00
   4. Concrete Reinforcement – Section 03 20 00

1.03 SUBMITTALS

A. Submit to the Architect four (4) copies of proposed laboratory trial mix designs in accordance with Method 1 ACI 301, or one (1) copy each of thirty (30) consecutive test results and the mix design used from a record of past performance in accordance with ACI 301, Method 2.

B. Submit manufacturer's data showing compliance with Specifications for the following products:
   1. Curing compounds.
   2. Sealer.
   3. Non-shrink grout.
   4. Waterstop.
   5. Floor hardener.
   6. Admixtures.
   7. Sieve analyses of aggregates, indicating source of aggregates and certification of compliance with specifications.

1.04 CONCRETE MIX DESIGNS

A. Selection of Proportions: Proportions of ingredients for concrete mixes shall be determined by an independent testing laboratory, in accordance with the requirements of Chapter 4 of the ACI Standard "Building Code Requirements for Reinforced Concrete" (ACI 318), to provide the characteristics listed on the drawings for each class of concrete.
   1. General: Concrete shall be composed of Portland Cement, fine aggregate, coarse aggregate, water, water-reducing admixture and an air entraining admixture, where specified. Proportions of ingredients shall produce a mixture which will work readily into corners and angles of forms and bond to reinforcement without segregation or excessive bleed water forming on the surface. Proportioning of materials shall be in accordance with ACI 211.1, "Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete." and or ACI 211.2, Standard Practice for Selecting Proportions for Structural Lightweight Concrete".
   2. Required Average Strength above Specified Strength: Determinations of required average strength above specified strength shall be based on the standard deviation record of the production facility, in accordance with ACI 301, "Specifications for Structural Concrete for Buildings". Calculation of standard deviation of compressive strength results shall be in accordance with ACI 214, "Recommended Practice for Evaluation of Strength Results of Concrete". Where the standard deviation record exceeds 600 psi. or if a suitable record of strength test performance is not available, proportions shall be selected to produce an average strength at least 1200 psi greater than the specified strength f'c.
   3. Trial mix designs and strength tests, made by a qualified independent materials laboratory, in accordance with ACI 301, Method 1, are required for the following types of concrete:
      a. Normal weight concrete with specified strength in excess of 4000 psi, to be poured at the job site.
      b. All concrete designs for which a suitable experience record is not available, as specified in the following articles.
   4. Mix designs based on a record of past performance in accordance with ACI 301, method 2, may be provided by a qualified concrete supplier or precast concrete manufacturer for concrete designs other than those designated in Article 3. Mix design shall be certified by an independent testing laboratory.
   5. All concrete mix designs shall include the following information:
      a. Proportions of cement, fine and coarse aggregates, and water.
      b. Water/cement ratio, design strength, slump and air content.
      c. Type of cement and aggregates.
      d. Air dry density.
      e. Type and dosage of all admixtures.
      f. Special requirements for pumping.
      g. Range of ambient temperature and humidity for which the design is valid.
      h. Any special characteristics of the mix which require precautions in the mixing, placing or finishing techniques to achieve the finished product specified.
   6. The testing laboratory providing concrete mix designs shall be selected by the Contractor, approved by the Architect and paid for by the Contractor.

1.05 LABORATORY TESTING AND INSPECTION

A. The Owner will engage an Independent Testing Laboratory that will be responsible for all testing and inspection of the cast-in-place concrete work. However, the Contractor shall provide and pay for the necessary testing services of the following:
   1. Qualification of proposed materials and the establishment of mix designs in accordance with "Building Code Requirements" of mix designs in accordance with "Building Code Requirements for Reinforced Concrete" ACI 318.
   2. Other testing services needed or required by the Contractor.

B. To facilitate testing and inspection, the Contractor shall:
   1. Furnish necessary labor to assist testing agency in obtaining and handling samples at the job site.
   2. Advise the testing agency in advance of operations, to allow for the assignment of testing personnel and testing.
   3. Provide and maintain for the use of the testing agency adequate facilities for proper curing of concrete test specimens on the project site, in accordance with ASTM C31, "Making and Curing Concrete Test Specimens in the Field."

C. Authority and Responsibilities of the Owner's Testing Laboratory:
   1. The laboratory representative shall immediately notify the Architect and the Contractor of any deviations from Specifications and approved design mixes which he observes at the mixing plant or the job site.
   2. If, in the opinion of the laboratory representative, the deviations observed will be probable cause for subsequent rejection of the material, he shall so inform the Contractor and Architect, so that a timely decision as to whether or not to continue operations can be made.
   3. Subsequent to on-the-spot verbal notification, the laboratory shall file a written report of any deficiencies or deviations noted, including a summary of conversations and decisions made and action taken at the time, in accordance with paragraph 1.
   4. The testing laboratory shall control field adjustments made to concrete mixes to compensate for field conditions, and report same, in accordance with paragraph 1.

D. Test Cylinders: Make at least one (1) test of each day's placement or each one hundred (100) cu. yards, whichever comes first, on each different portion or section of the work. Mold and cure specimens in accordance with ASTM C31, and test in accordance with ASTM C39. Take specimens after all water has been added. Test Cylinders shall be made and tested by the laboratory in accordance with ASTM C 172. Footings, walls and floor systems constitute different sections. Each test shall consist of four (4) specimens, two (2) of which shall be broken at seven (7) days, and two (2) at twenty-eight (28) days. Determine temperature and air content for each set of test cylinders in accordance with ASTM C231.

E. Field Quality Control:
   1. Determine slump for each strength test and whenever consistency of concrete appears to vary, in accordance with ASTM C143.
   2. Monitor addition of water to concrete and length of time concrete is allowed to remain in truck.
   3. Certify delivery tickets indicating class of concrete, amount of water added during initial batching and time initial batching occurred.

F. Source Quality Control: Periodically inspect and control concrete mixing and loading of transit mix trucks at batch plant at intervals as agreed to by Architect and laboratory personnel.

G. Evaluation and Acceptance:
   1. The strength level of the concrete will be considered satisfactory if the averages of all sets of three consecutive strength test results equal or exceed specified strength and no individual test result (average of two cylinders) is below specified strength by more than 500 psi.
   2. When the strength level of the concrete for any portion of the structure, as indicated by cylinder tests, is below the specified requirements, the Contractor shall provide improved curing conditions of temperature and moisture and/or propose adjustments to the mix design, to secure the required strength. Also, if the average strength of the laboratory control cylinders should fall so low as to be deemed unacceptable, the Contractor shall, at his expense, follow the core test procedure set forth in ACI 301, Chapter 17, in locations approved by the Architect. If the results of the core tests indicate, in the opinion of the Architect, that the strength of the structure is inadequate, such replacement, load testing, or strengthening as may be ordered by the Architect shall be provided by the Contractor without cost to the Owner.
   3. Completed concrete work will be accepted when the requirements of "Specifications for Structural Concrete for Buildings, " ACI 301, Chapter 18, have been met.

1.06 QUALITY ASSURANCE

A. The latest edition of all standards referenced in this section shall apply, unless noted otherwise.

B. Materials and work shall conform to the requirements of all standards, codes, and recommended practices required in this Section. In conflicts between standards, required standards and this Specification, or this Specification and the local Building Code, the more stringent requirement shall govern.
   1. Referenced Standards:
      a. ACI 301, "Specifications for Structural Concrete for Buildings", ACI 301-72 (revised 1981)
      b. "Building Code Requirement for Reinforced Concrete", ACI 318.
      c. ASTM C94, Standard Specifications for Ready-Mix Concrete.
      d. "Hot Weather Concreting, 1977" (ACI 305)
      e. "Cold Weather Concreting, 1978" (ACI 306).
      f. "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete", (ACI-304)
      g. "Standard Practice for Consolidation of Concrete", Committee Report (ACI-309).
   2. Field Reference Manual: Contractor shall have available in the field office "Specifications for Structural Concrete for Buildings" with selected references of ACI SP-15 (81).
   3.

PART 2 – PRODUCTS

3.01 MATERIALS FOR STRUCTURAL CONCRETE

A. Portland cement shall conform to the requirements of ASTM Designation C 150, Type I or Type III or ASTM Designation C 595, Type IP. Only one (1) brand of cement shall be used throughout the work.

B.

C. Fine aggregate shall conform to the applicable requirements of the current edition of ASTM Designation C33, and shall be natural bank or river sand, washed and screened, consisting of hard, durable, uncoated particles free of deleterious matter, and shall be so graded from coarse to fine, as to produce a minimum percentage of voids. Representative samples from each proposed source of supply shall be submitted to the testing laboratory for approval before any shipment is ordered, and all fine aggregate used shall, within reasonable limits, conform to approved samples.

D. Coarse aggregate for hardrock concrete shall conform to the applicable requirements of the current edition of ASTM Designation C 33, shall be gravel or crushed stone suitable processed, washed and screened, and shall consist of hard, durable particles without adherent coatings.

E. Concrete Admixtures: Provide admixtures produced and serviced by established, reputable manufacturers and use in compliance with manufacturer's recommendations. Do not use admixtures which have not been incorporated and tested in accepted mixes.
   1. Air-entraining agent, conforming to ASTM C 260. Use of air entrainment and corresponding reduction in w/c ratio shall be noted on the mix designs.
   2. Water-reducing Admixtures: ASTM C494, Type A.
   3. Set-controlling Admixtures: ASTM C494, and as follows:
      a. Type C, Accelerating.
      b. Type D, Water-reducing and Retarding.
      c. Type E, Water-reducing and Accelerating.
      d. Type F, Water-reducing, high-range. (superplasticizer).
      e. Type G, Water-reducing, high-range and retarding (superplasticizer).
      f. Field Service: When requested a qualified concrete technician employed by the manufacturer shall be available to assist in proportioning concrete materials for optimum use, to advise on proper use of the admixture, and adjustment of concrete mix proportions to meet job site and climatic conditions.
      g. Obtain approval of the Architect, in writing, before using set-controlling admixtures.
   4. Calcium chloride will not be permitted in the concrete admixtures. Do not use admixtures containing more than 0.05% chloride ions.
   5. Certification: Written conformance to above mentioned requirements and the chloride ion content will be required from the admixture manufacturer prior to mix design review by the Engineer.
   6. Fly Ash conforming to ASTM C 618, Class "C" may be used in non-architecturally exposed concrete. Carbon content may not exceed 3% by volume.
      a. When requested, certification attesting to the carbon content and compliance with ASTM C 618, shall be furnished.
      b.

3.02 WATER

A. Use City water.

3.03 CURING MATERIALS

A. Materials providing water retention not exceeding loss of 0.055 gm/cm2 when used at a coverage of 200 square feet per gallon and tested in accordance with ASTM C 156.
   1. Curing compound shall conform to the requirements of ASTM C 309, "Specifications for Liquid Membrane-Forming Compounds for Curing Concrete," equal to "Sealtight AR-30-C". Curing Compound used on exposed concrete walls and columns shall be non-discoloring, fast drying and shall be conclusively demonstrated not to darken or yellow with age. Curing compound for use on concrete floor surfaces to receive resilient flooring or other adherent covering shall be specially formulated for such use and shall be certified by the manufacturer not to inhibit the bonding qualities of flooring adhesives. Acceptable sources: Master Builders, W.R. Meadows, Dayton Superior.
   2. Curing and sealing compound shall be an acrylic sealer equal to "Sealtight CS-309" as manufactured by W.R. Meadows, Inc. or "Sealco 309" as manufactured by the Gilford Hill Co. Use of these products shall be limited exclusively to permanently exposed concrete surfaces.

3.04 FINISHING MATERIALS

A. Cement floor leveling compound shall be Camp's "Latex Mix" (liquid Felt up to 1/8" over 1/8" mix with Portland Cement and Sand) as distributed by the Tichenor Company Dallas, Texas, or approved equal.

B. Retarder shall be "E.A.C Super Tuf-coat 66" retarder as manufactured by Preco Chemical Corporation, or approved equal. Color shall be as recommended by the manufacturer.

3.05 MISCELLANEOUS MATERIALS

A. Waterstops shall be made of virgin polyvinyl chloride compound and shall have the following properties:

Tensile Strength	2,200 psi
Ultimate Elongation	400%
Brittleness Temperature	-35°F

Waterstops shall be produced by an extrusion process and shall be uniform in dimension, homogenous and free from porosity. Unless otherwise shown, use waterstops of 6-inch minimum width and 3/8-inch minimum thickness. Use dumbell type at construction joints unless noted otherwise.

B. Expansion joint material shall be preformed expansion joint material, conforming to ASTM D 1751.

C. Vapor retarder under any slab on grade in areas with moisture sensitive flooring shall be 15-mils thick polyolefin sheet conforming to ASTM E1745, Class A, having a maximum

permearce of 0.02 perms when tested in accordance with ASTM E96, Tape for joints shall have at least the same permeability as the vapor barrier specified and shall be a minimum of four (4) inches wide. Acceptable products are Stego Products “Stego Wrap 15”, Reef Industries “Vaporguard”, and W. R. Meadows “Ferminator 15 mil”.

D. Drainage matting for basement walls shall be as specified in Section 07110 Membrane water proofing.

E. Drilled anchor bolts shall be one of the following:

Expansion Bolts:
Strong-Bolt, Simpson Strong-Tie Co., Pleasonton, CA
Power-Stud+SD1, power Fasteners, Brewster, NY
Kwik Bolt TZ, Hilti Fastening Systems, Tulsa, OK

Adhesive Anchors:
SET-XP Epoxy Anchoring System, Simpson Strong-Tie Co., Pleasonton, CA
PE1000+ Standard Set Adhesive Anchoring System, Power Fasteners, Brewster, NY
HIT-HY200 “Safe Set” Adhesive Anchoring System, Hilti Fastening Systems, Tulsa, OK

F. Touch-up coating for field application to metal accessories shall be ZRC Cold Galvanizing Compound as manufactured by ZRC Chemical Products, Quincy, Mass.

G. Anchor slots to receive inserts for anchoring masonry units, cast stone, and marble to concrete shall be continuous No. 22 gauge, galvanized sheet steel, with dovetailed slots, complete with felt lining, equal to No. 305, made by Hohmann & Barnard, Inc., New York, New York, or approved equal. Slots shall be one (1) inch wide and seven eights (7/8) inch deep.

3.06 NON-SHRINKING GROUT

A. Non-shrink Grout: Pre-mixed, non-shrinking, high strength grout. Compressive strength in twenty-eight (28) days shall be 5000 psi. minimum, but in no case less than the specified strength of the base concrete. Manufacturer shall provide evidence that the material meets the criteria of the Corps of Engineers Specification No. CRD-C-621. Grout permanently exposed to view shall be non-oxidizing. Metallic grout may be used in other locations.

Gifford-Hill Co. – “Supreme”
Master-Builders Co. – “Masterflo 713”

3.07 EPOXY

A. Epoxy Adhesive: Shall conform to ASTM C881. Acceptable manufacturer's are: "Euco Epoxy 463 or 615, made by the Euclid Chemical Co., or "Sikadur Hi-Mod", by Sika Chemical Corp. The compound shall be a two (2) component, 100% reactive compound suitable for use on dry or damp surfaces.

3.08 ANCHORING CEMENT

A. Anchoring cement for grouting anchor bolts and dowels shall be "SUPER POR-ROK" (Exterior Anchoring Cement), as manufactured Minwax Construction Products Division, Montvale, New Jersey.

3.09 SAND-CEMENT GROUT

A. Sand-cement grout shall be a mixture of one (1) part Type I Portland Cement and three (3) parts clean, natural sand, conforming to ASTM C 330. Water content shall be five and one-half (5 1/2) gallons per sack of cement, maximum.

3.10 BONDING COMPOUND

A. Two component, moisture insensitive, extended pot life, such as "Euco-Weld" made by Euclid Chemical Company, or approved equal.

3.11 SEALER

A. Sealer shall be "KRSTL-PLATE" as manufactured by Vestal Laboratories, St. Louis, Mo., or approved equal by the Architect.

PART 3 – EXECUTION

3.01 PRODUCTION OF CONCRETE

A. Concrete shall not be mixed for placing in the work until mix designs and corresponding strength tests reflect that each proposed mix will develop the strengths required, nor before the mix design for each class of concrete has been approved by the Architect for use on the project.

B. Measuring Ingredients:
   1. The ingredients for concrete shall be measured separately for each batch.
   2. The proportions of aggregates to cement shall be such as to produce concrete that will work readily into the corners and angels of the forms and around the reinforcement and inserts without excessive vibration, puddling or spading, and without permitting the ingredients to separate or free water to collect on the surface of the concrete. The combined aggregates shall be of such combination of sizes as not to produce harshness in placing or honeycombing in the structure. The ratio between fine and coarse aggregates

shall be as directed by the testing laboratory, but may be modified, when and as directed, in order to obtain a denser or more workable mix without altering the ratios, (between cement and the combined aggregates prescribed by the testing laboratory).

3. Water shall be so measured as to assure uniform proportions, in the required quantities, throughout successive batches. Methods employed for measuring the water shall be such as to permit close and positive control over the ratio of water to cement, and shall afford ready check by the testing laboratory. Water shall be limited to the minimum quantity required to produce concrete of workable consistency. The effect of the cement-dispersing agent to be used shall be taken into consideration in determining the amount of water to be used. The maximum quantity of water specified shall include the free moisture content retained by the aggregates. The accumulation of water on the surface of the concrete during placing shall be prevented by making appropriate adjustments in the mixture.

C. Maximum replacement of cement with fly ash shall be 20% by weight.

D. Mixing: Transit-mixed concrete conforming to the requirements of ASTM C 94, shall be used in lieu of concrete mixed at the job site. Concrete shall be transported or used in any case after a period in excess of ninety (90) minutes has elapsed after the introduction of water into the mixer. The agency supplying transit-mixed concrete shall have a plant of sufficient capacity, and adequate transportation facilities, to assure continuous delivery at the rate required. The frequency of deliveries to the site of the work must be such as to provide for placing the concrete continuously throughout any one (1) pour.

3.02 PLACING CONCRETE

A. Preparation:
   1. Equipment for chuting, pumping and pneumatically conveying concrete shall be of such size and design as to assure a practically continuous flow of concrete at the delivery end without separation of the materials, and all the details thereof shall be submitted to the Architect for approval in advance of the use of such equipment. The use of gravity-flow or aluminum chutes or conveyors for transporting concrete horizontally will not be permitted.
   2. Inserts: Give the various trades and subcontractors ample notification and opportunity to install any and all anchors, nailers, pipes, conduits, boxes, inserts, thimbles, sleeves, frames, vents, wires, supports or other items required to be built into the concrete by the provisions of the drawings or of the Specifications governing the work of such trades and subcontractors, or as may be necessary for the proper execution of their work. Obtain suitable templates or instructions for the installation of such items as are not required to be actually placed in the forms by the affected trades or subcontractors themselves.
   3. Contractor shall provide access for delivery and sufficient equipment and manpower to rapidly place all concrete.
      a. All work shall be in accordance with ACI 304-73, “Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete”.

b. Formwork shall have been completed. Snow, ice, water and debris shall have been removed from within forms.
c. Expansion joint material, anchors, and all embedded items shall have been positioned.

4. Thoroughly wet all forms and contact surfaces before pouring concrete.
5. Apply drainage matting to all vertical rock surfaces which are to serve as a form for basement wall.

B. Conveying Concrete:
1. Convey concrete from the mixer to the place of final deposit, by methods which will prevent the separation or loss of the ingredients. Concrete to be conveyed by pumping will require approval of the Engineer, for each class of concrete specified, before being used. In general, it is the intent of these Specifications that architecturally exposed concrete will not be pumped.

C. Depositing Concrete:
1. General: Place concrete in reasonable uniform layers, approximately horizontal, and not more than twelve (12) inches deep, except for columns which may be poured full height, exercising care to avoid vertical joints or inclined planes. The piling up of concrete in the forms, in such manner as to cause the separation or loss of any of its ingredients, will not be permitted. Concrete which has partially set or hardened shall not, under any circumstances, be deposited in the work. Place concrete in the forms as nearly in its final position as is practical to avoid re-handling. Exercise special care to prevent splashing the forms or reinforcement with concrete. Remove any hardened or partially hardened concrete which has accumulated on the forms or reinforcement before the work proceeds. Do not place concrete on previously deposited concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the respective member or section, except as hereinafter specified. Do not permit concrete to drop freely any distance greater than three (3) feet. Where longer drops are necessary, use a chute, tremie, or other approved conveyance to assist the concrete into a place without separation. Do not pour concrete directly into any excavations where water is standing. If the place of deposit cannot be successfully pumped dry, pour through a tremie with its outlet end near the bottom of the place of deposit.
2. Slump: Concrete shall not be placed when its plasticity, as measured by slump tests, is outside the limits shown on the drawings.
3. Classes of Concrete and Usage: Concrete, of the several classes of concrete required, shall have the characteristics shown on the drawings.
4. Vibration: As soon as concrete is deposited, thoroughly agitate the same by means of mechanical vibrators and suitable hand tools, so manipulated as to work the mixture well into all parts and corners of the forms, and entirely around the reinforcement and inserts. Mechanical vibrators shall have a minimum frequency of 7000 revolutions per minute and shall be operated by competent workmen. Over vibrating and use of vibrators to transport concrete within forms shall not be allowed. Vibrators shall be inserted and withdrawn at regular intervals, from eighteen (18) to thirty (30) inches apart. At each

insertion, the duration shall not be sufficient to cause segregation, generally from five to fifteen seconds duration. A spare vibrator shall be kept on the job site during all concrete placing operations. Do not insert vibrator into lower courses that have begun to set.

5. Bonding: Before depositing any new concrete on or against previously deposited concrete which has partially or entirely set, the surfaces of the latter shall be thoroughly roughened and cleaned of all foreign matter, scum and laitance. The forms shall be retightened and the surface of the previously deposited concrete shall be slushed with water on bonding agent. The work shall be performed in such a manner as to assure complete bonding of the newly poured concrete to that previously placed.
6. Construction Joints: Except as otherwise specifically indicated on the drawings each footing, pier, column, beam and slab shall be considered as a single unit of operation, and all concrete for the same shall be placed continuously in order that such unit will be monolithic in construction. Should construction joints prove to be absolutely unavoidable, the same shall be located at or near the midpoints of spans. Additional construction joints shall not be made under any circumstances without the written approval of the Architects.
7. Walls: Construct concrete walls to the heights, thicknesses and profiles shown on the drawings. Wall surfaces which will be permanently exposed to view shall have all fins removed and all holes, voids and honeycombed places filled. Those surfaces shall have a rubbed finish.
8. Columns: Place concrete through a tremie to assist the concrete flow in and about the bars and ties or spirals. Pour concrete in the columns up to a height of one (1) inch below the soffit of the deepest intersection beam or slab. Secure each column to its support footing with steel dowels of the sizes and number shown on schedules.
9. Beams: Do not place concrete in any beams until the concrete in the supporting members has set at least twenty-four (24) hours. Construct tops of all beams to the camber shown on the drawings or schedule.
10. Slabs:
    a. Pour the slabs with proper offsets, slopes to drains, etc., as shown or noted, and finish as specified.
    b. All concrete slabs above the ground level shall be poured to the required thickness as indicated on schedules.
    c. Outside bars of slab reinforcement, both main and temperature steel, parallel to beams or wall, shall be placed not farther than one-half (1/2) bar spacing away from the adjacent face of such parallel member.
11. Pan Joists: Such slabs shall be of the respective joists spacing and thickness shown on the drawings. Pour the slabs with proper offsets, slopes to drain, etc., as shown or noted on the drawings.
12. Concrete on Metal Deck
    a. Before placing concrete on metal deck, clean surfaces to remove all dirt and debris. Use compressed air if necessary.
13. Concrete Platforms and Foundations for Mechanical and Electrical Equipment: Concrete fill shall be normal weight concrete (2500 psi). Reinforce normal weight concrete fill with welded steel wire fabric, 4x4-W1.4xW1.4, set midway in fill. Trowel concrete

topping to a dense, smooth finish. Set anchor bolts for securing mechanical or electrical equipment during pouring of normal weight concrete fill, accurately located by templates.

14. Protective Slabs: Where protective slabs are indicated on the drawings, it shall be normal weight concrete (3000 psi min.) with minimum thickness of three and one-half (3-1/2) inch. Reinforce protective slabs with 6x6-W2.0xW2.9 WWF reinforcing. Finish slab as specified under Article 3.12, paragraph D – "Troweled Finish".
15. Miscellaneous: Construct any and all items of concrete work required for or in connection with the satisfactory completion of the project, whether each such item is specifically shown or referred to.

D. Anchor Bolt Placement:
   1. Use templates to set all anchor bolts and secure in proper position before placing concrete. "Stabbing" bolts is not permitted.

E. Weather Conditions:
   1. Cold Weather: Concreting shall conform to requirements of ACI 306.1. Temperature of concrete delivered at the job site shall conform to the following minimum:

Air Temperature	Concrete Temperature
30 to 45 degrees F.	55 to 90 degrees F.
0 to 30 degrees F.	60 to 90 degrees F.
Below 0 degrees F.	65 to 90 degrees F.

      Water heated to above 100 degrees F. shall be combined with the aggregates before cement is added. Cement shall not be added to water or aggregates having a temperature greater than 100 degrees F.

      a. Work shall be in accordance with ACI 306R-88, "Cold Weather Concreting".
      b. When the outdoor temperature is less than 40 degrees F. temperature of the concrete shall be maintained at not less than 50 degrees F. for the required curing time.
         1) Arrangements shall be made before placement to maintain required temperature without injury from excessive heat.
         2) Combustion heaters shall not be used during the first forty-eight (48) hours without precautions to prevent exposure of concrete and workmen to exhaust gases containing carbon dioxide and carbon monoxide.

   2. Hot Weather: Temperature of concrete delivered at the job site shall not exceed 95 degrees F. Ingredients shall be cooled before mixing to prevent concrete temperature in excess of 95 degrees F.
      a. All work shall be in accordance with ACI 305R-89, "Hot Weather Concreting".
      b. Use an evaporation retarder/finishing aid, equal to "Confilm" by Master Builders.

3.03 FILL FOR STEEL PAN STAIRS

A. Mix one (1) part Portland Cement, two (2) parts crushed stone or gravel passing a one-fourth (1/4) inch sieve and retained on a one-eighth (1/8) inch sieve, measured by volume, and with only sufficient water to produce a dry consistency for proper placing and finishing.

B. Placing: Place fill and reinforcement in all steel pan treads and intermediate platforms. Reinforcement shall be welded steel wire fabric, 2”x2” by 14 ga., extending over the entire area of each tread and platform and properly supported one-half (1/2) inch above the bottom of the steel pans. After sufficient hardening of the concrete fill, steel trowel the exposed surface to a smooth, even, dense finish.

3.04 INSTALLATION OF VAPOR BARRIER

A. Granular fills shall be smooth. Install vapor barrier to form a continuous layer under concrete slabs on grade. At laps, film shall be lapped not less than six (6) inches. Seal with four (4) inch wide pressure sensitive tape with same perm rating as vapor barrier. Carefully cut film around pipes and conduits and the apply tape around these protrusions.

B. Install vapor barrier to form a continuous layer under the slab and above void boxes supporting a structural floor.

3.05 INSTALLATION OF NON-SHRINK GROUT (Under base plates)

A. Grout under all bearing plates, immediately after setting plates, before additional load is applied.

B. Preparatory Work: Clean slab, or foundation with liberal amounts of water. Remove all oil, grease and paint from areas of base plates or foundations to be grouted. Roughen slab and remove all waste materials, dirt, chips, oil, and excess water from anchor bolts, slab or foundation. Have all necessary tools and materials as near to the area to be grouted as possible to permit rapid and continuous work with grout. Anchor all forms securely to prevent movement during placing or curing. Adequate clearance must be allowed between forms and base plates.

C. Mixing: A mechanical mixer should be used. Add only enough water to make placeable. Do not mix more grout than can be placed in twenty (20) minutes. Under no circumstances should grout be re-tempered.

D. Grout Temperatures: Grout temperatures should be maintained at 50-90 degrees F (10-32 degrees Celsius). When conditions dictate, these temperatures can be achieved by use of cool mixing water or heated mixing water. Care should be exercised so that extremes of hot or cold are not use.

E. Placing: As grouting procedure begins, placement and compaction should be continuous until completed. Lengths of banding strap placed in forms before placing grout will assist in

compacting the grout and eliminating air pockets. Strap should be worked in quick, short strokes and be removed before initial set occurs. Grout should be placed from one end or side only to avoid excessive air entrapment and assure good compaction. Wherever possible, grout bolt holes first. Do not overwork grout as this causes segregation, bleeding and breakdown of initial set. If machines or equipment are being used nearby, consider shutting them down until grout takes final set.

3.06 FINISH CONCRETE SLAB SURFACES

A. General: Concrete slabs shall be finished as hereinafter described. The dusting of wearing surfaces with dry materials will NOT be permitted. In preparation for finishing, slab shall be struck off true by double screeding to the required level at or below the elevation or grade of the finished slabs as indicated on the drawings. Slab surfaces to receive carpeting shall be level with tolerance of one-fourth (1/4) inch in ten (10) feet when tested with a ten (10) foot long straight edge. All other slab surface shall be level within a tolerance of one-eight (1/8) inch in ten (10) feet when tested in the same manner. Apply straightedge to the slabs at three (3) foot intervals in both directions, lapping straightedge four (4) feet on areas previously checked. Maximum deviation in any one area shall be plus or minus one-fourth (1/4) inch from elevations indicated on the drawings.

B. Trowel Finish:
   1. Locations:
      a. All concrete surfaces except noted otherwise.
   2. Method of finishing: Concrete slabs shall be finished by tamping the concrete with special tools to force the coarse aggregate away from the surface, and then screeding and floating with straightedges to bring the surface to the required finish level. While the concrete is still green but sufficiently hardened to bear a man's weight without deep imprint, it shall be wood-floated to a true plane with no coarse aggregate visible. Sufficient pressure shall be used on the wood float to bring the moisture to the surface. The concrete shall be hand troweled to produce a smooth impervious surface for the purpose of burnishing. The final troweling shall produce a ringing sound from the trowel. Should this not be obtained in the original finish, high spots shall be ground down and low spots filled with material specified.

C. Wood Float Finish:
   1. Locations: All concrete surfaces under
      a. Waterproofing
      b. Setting beds for:
         1) Mud-set tile
         2) Mud-set pavers
   2. Method of Finishing: Concrete slabs shall be finished by tamping the concrete with special tools to force the coarse aggregate away from the surface, and then screeding and floating with straightedges to bring the surface to the required finish level shown on the drawings. While the concrete is still green but sufficiently hardened to bear a man's

weight without deep imprint, it shall be wood-floated to a true plane with no coarse aggregate visible. Sufficient pressure shall be used on the wood float to bring the moisture to the surface. Prior to initial set, concrete surfaces shall again be wood-floated to a tight float finish with a texture as approved by the Architect.

D. Broom Finish:
   1. Locations: Concrete Driveway, Walks and Exterior stairs.
   2. Method of Finishing: Concrete slabs shall be finished by tamping the concrete with special tools to force coarse aggregate away from the surface, and then screeding and floating with straightedges to bring the surface to the required finish level shown on the drawings. As soon as the surface of the concrete is sufficiently hardened to bear a man's weight without deep imprint, it shall be wood-floated to a true plane with no coarse aggregate visible. Ramp surfaces shall then be cross jointed with a three-fourths (3/4) inch diameter jointing tool for then entire width of the ramps. Space cross joints at six (6) inch intervals. Concrete shall then be troweled to produce a smooth surface. After troweling, the concrete surfaces shall be brushed with a stiff fiber brush to produce uniformly striated surfaces parallel with cross jointing. Again, cross joint impervious grooves formed to clearly define these indentations.

E. Brush Finish:
   1. Locations: Parking, drive islands and other locations noted on the drawings, ramps steeper than 7 percent slope.
   2. Method of Finishing: Same method as specified for trowel finish, except prior to final set of concrete, brush concrete surfaces with soft bristle broom to texture as approved by the Architect.

F. Power Machine Finishing: In place of hand finishing, the Contractor may use a power troweling machine, approved by the Architect, for finishing the concrete surfaces. The preparation of concrete surfaces for finishing by machine shall be the same as required for hand finishing.

3.07 FINISHING EXPOSED CONCRETE SURFACES

A. General: It is the intent of these Specifications to provide for exposed concrete surfaces of such quality as to require a minimum of pointing. Such care shall be exercised in the forming, mixing and placing of the concrete as to assure reasonably uniform, dense surfaces, free from blemishes or defects. In the event of unsightly voids, honeycombs, etc., they shall be repaired as soon as possible. Lose particles shall be removed from honeycombed spots. Fins and other projections shall be neatly dressed off. Holes shall be drenched with clean water and properly patched with Portland Cement and sand mortar of color and texture to match surrounding concrete.

B. Rubbed Finish: A rubbed finish shall be given to exposed vertical poured-in-place structural concrete surfaces which are not to receive any other finish or coating. Rubbed finish shall

consist of rubbing with a carborundum stone, clean water, and neat Portland Cement to a uniformly smooth surface, entirely free of pits, holes or form marks.

3.08 FILLING TIE ROD AND BOLT HOLES

A. Holes resulting from the removal of bolts or tie rods shall be solidly filled with cement grout. Holes passing entirely through concrete members shall be filled from the inside face, with a plunger-type grease gun or other device that will force the mortar through to the outside face, holding a canvas sack at the exterior surface to assure complete filling. Holes which do not pass entirely through shall be filled, using tools which will permit the opening to be packed thoroughly full. All excess mortar at the faces of filled holes shall be struck off flush, with a canvas sack.

3.09 CURING AND PROTECTION

A. Protect all freshly placed concrete from washing by rain, flowing water, etc. Do not allow the concrete to dry out from the time it is deposited in the forms until the expiration of the curing period hereinafter specified. The methods of curing shall be as specified in the following paragraphs, unless otherwise authorized by the Architects.

B. Concrete surfaces, not otherwise specified, shall be cured by being kept wet with clean water for a period of not less than seven (7) days after placing. Each day the form are left in place, and kept wet enough to prevent the opening of joints in the forms and the drying out of the concrete, will be counted as one (1) day of curing.

C. In lieu of the wetting specified above, and provided that the temperature of the air does not exceed 90 degrees F during the previous five (5) days before the pour, the Contractor may use a non-bituminous liquid curing compound as specified to hold the moisture in the concrete. Contractor shall verify that curing compound will not adversely affect flooring adhesive. Curing liquid, if used, shall be applied in conformance with the recommendations of the manufacturer of the material approved for use, and to sufficient extent to effectively hold the moisture in the concrete. The use of such material shall not relieve the Contractor of the responsibility of protecting all floor slabs platforms, and steps whenever any scaffolding, shoring, formwork, masonry, concrete or other work is being done over or above finished concrete slabs. Patches in architectural surfaces shall be cured for seven (7) days. Patches shall be protected from premature drying to the same extent as the mass of the concrete.

D. Imperfect or damaged work, or any material damaged or determined to be defective before final completion and acceptance of the entire job, shall be satisfactorily replaced at the Contractor's expense, and in conformity with all of the requirements of the Drawings and Specifications. Removal and replacement of concrete work shall be done in such manner as not to impair the appearance or strength of the structure in any way.

E. Cleaning: Upon completion of the work, all forms, equipment, protective coverings and any rubbish resulting therefrom shall be removed from the site. After sweeping with an ordinary broom and removing all mortar, concrete droppings, loose dirt, mud, etc., wash all concrete floors and platforms with soapsuds and scrub with a stiff fiber brush. Mop up the suds and flush the surfaces with clean water. Provide adequate measures during scrubbing, mopping and flushing operations to keep excessive or injurious amounts of water off resilient tile floors. Any damage to floors shall be promptly, effectively and satisfactorily repaired. Finished concrete surfaces shall be left in a clean and perfect condition, satisfactory to the Owner.

END OF SECTION 03 30 00

SECTION 03 35 00 - CONCRETE FINISHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Liquid densifiers and hardeners.

B. Related Sections
   1. Section 03 30 00 - Cast-in-Place Concrete: Finishing of concrete surface to tolerance; floating, troweling, and similar operations; curing.
   2. Section 03 30 00 - Cast-in-Place Concrete: Curing compounds that also function as sealers.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with concrete floor placement and concrete floor curing.

1.4 SUBMITTALS

A. Refer to Section 01 33 00 - Submittal Procedures, for submittal procedures.

B. Product Data: Manufacturer's published data on each finishing product, including information on compatibility of different products and limitations.

C. Product Data: Manufacturer's published data and installation instructions for concrete polishing system and finishing products, including manufacturer's installation instructions, information on compatibility of different products, and limitations.

D. Manufacturer's certification that products comply with and have been tested and approved in compliance with Florida Product Approval or Miami Dade NOA and applicable requirements.

E. Maintenance Data: Provide data on maintenance and renewal of applied finishes.

F. Specimen Warranty: Manufacturer warranty.

1.5 QUALITY ASSURANCE

A. For slabs indicated to receive concrete polishing system, do not proceed with concrete polishing unless manufacturer's representative and specialized equipment is present for every day of placement.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's sealed packaging, including application instructions.

1.7 FIELD CONDITIONS

A. Maintain light level equivalent to a minimum 200 W light source at 8 feet above the floor surface over each 20 foot square area of floor being finished.

B. Do not finish floors until interior heating system is operational.

C. Maintain ambient temperature of 50 degrees F minimum.

1.8 WARRANTY

A. Refer to Section 01 77 00 - Closeout Procedures and checklist for additional warranty requirements.

B. Correct defective work within a two-year period commencing on the Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CONCRETE FLOOR FINISH APPLICATIONS

A. Typical Concrete Finishing:
   1. Unless otherwise indicated, all exposed concrete floors are to be finished using liquid densifier and hardener.

2.2 DENSIFIERS AND HARDENERS

A. Liquid Densifier and Hardener: Penetrating chemical compound that reacts with concrete, filling the pores, hardening, and dustproofing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that floor surfaces are acceptable to receive the work of this section.

B. Verify that flaws in concrete have been patched and joints filled with methods and materials suitable for further finishes.

3.2 GENERAL

A. Apply materials in accordance with manufacturer's instructions.

3.3 COATING APPLICATION

A. Verify that surface is free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and other impediments to adhesion.

B. Protect adjacent non-coated areas from drips, overflow, and overspray; immediately remove excess material.

C. Apply coatings in accordance with manufacturer's instructions, matching approved mock-ups for color, special effects, sealing and workmanship.

END OF SECTION 03 35 00

SECTION 04 01 20 - MAINTENANCE OF UNIT MASONRY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes special requirements for maintenance of existing unit masonry, including:
   1. Repairing unit masonry, including replacing units.
   2. Re-anchoring veneers.
   3. Repointing joints.

B. Related Sections:
   1. Section 04 05 00 - Common Work Results for Masonry: Quality assurance requirements, mortar, grout, ties and anchors, reinforcement, embedded flashing, masonry water repellent, masonry accessories, and masonry cleaning.
   2. Section 04 21 13.23 Brick Masonry: Brick veneer unit masonry.

1.3 SUBMITTALS

A. Product Data: Technical data for each type of product, including material descriptions and application instructions and test data substantiating that products comply with requirements.

B. Shop Drawings for the Following:
   1. Provisions for expansion joints or other sealant joints.
   2. Replacement and repair of anchors. Include details of anchors within individual masonry units, with locations of anchors and dimensions of holes and recesses in units required for anchors.
   3. Field investigation report outlining work required after existing construction is removed from masonry surface.

1.4 QUALITY ASSURANCE

A. Cleaning Program:
   1. Prepare a written cleaning program that describes cleaning process in detail, including materials, methods, and equipment to be used; protection of surrounding materials; and control of runoff during operations. Include provisions for supervising worker performance and preventing damage:
      a. If materials and methods other than those indicated are proposed for any phase of cleaning work, add a written description of such materials and methods, including evidence of successful use on comparable projects and demonstrations to show their effectiveness.

B. Mockups:
   1. Prepare mockups of cleaning on existing surfaces to demonstrate aesthetic effects and to set quality standards for materials and execution:
      a. Clean an area approximately 25 square feet (2.3 sq. m) for each type of masonry and surface condition:
         1) Test cleaners and methods on samples of adjacent materials for possible adverse reactions. Do not test cleaners and methods known to have deleterious effect.
         2) Allow a waiting period of not less than seven (7) days after completion of sample cleaning to permit a study of sample panels for negative reactions.
      b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

C. Preconstruction Testing Service:

1. Engage one (1) or more chemical cleaner and paint remover manufacturer(s) to perform pre-construction testing on masonry surfaces:
    a. Use test areas as indicated and representative of proposed materials and existing construction.
    b. Propose changes to materials and methods to suit.

D. Pre-Installation Conference:
1. Conduct conference at Project site:
    a. Review methods and procedures related to cleaning masonry including, but not limited to, the following:
        1) Verify masonry cleaning equipment and facilities needed to make progress and avoid delays.
        2) Materials, material application, and sequencing.
        3) Cleaning program.
        4) Coordination with building occupants.

PART 2 PRODUCTS

2.1 CLEANING MATERIALS

A. Refer to Section 04 05 00 - Common Work Results for Masonry.

2.2 ACCESSORY MATERIALS

A. Refer to Section 04 05 00 - Common Work Results for Masonry.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation when existing and forecasted weather conditions permit masonry cleaning work to be performed according to product manufacturers' written instructions and specified requirements.

B. Clean masonry surfaces only when air temperature is 40 degrees F (4 degrees C) and above and is predicted to remain so for at least seven (7) days after completion of cleaning.

3.2 SEQUENCING AND SCHEDULING

A. Perform masonry cleaning work in the following sequence:
1. Remove plant growth.
2. Inspect for open mortar joints. Where repairs are required, delay further cleaning work until after repairs are completed, cured, and dried to prevent the intrusion of water and other cleaning materials into the wall.
3. Remove paint.
4. Clean masonry surfaces.
5. Where water repellents are to be used on or near masonry, delay application of chemicals until after cleaning.

3.3 PROTECTION

A. Comply with each manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent paint removers and chemical cleaning solutions from coming into contact with people, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by contact:
1. Cover adjacent surfaces with materials that are proven to resist paint removers and chemical cleaners used unless products being used will not damage adjacent surfaces. Use protective materials that are waterproof and UV resistant. Apply masking agents according to manufacturer's written instructions. Do not apply liquid strippable masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
2. Do not apply chemical solutions during winds of enough force to spread them to unprotected surfaces.
3. Neutralize alkaline and acid wastes before disposal.

4. Dispose of runoff from operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

B. Remove gutters and/or downspouts and associated hardware adjacent to immediate work area and store during masonry cleaning. Reinstall when masonry cleaning is complete:
   1. Provide temporary rain drainage during work to direct water away from building.

3.4 CLEANING MASONRY

A. Cleaning Appearance Standard: Cleaned surfaces are to have a uniform appearance as viewed from 20 feet (6 m) away by Architect.

B. Proceed with cleaning working from top to bottom of each scaffold width and from one end of each elevation to the other. Ensure that dirty residues and rinse water do not wash over dry, cleaned surfaces.

C. Use cleaning methods indicated for each masonry material and location:
   1. Brushes: Do not use wire brushes or brushes that are not resistant to chemical cleaner being used.
   2. Spray equipment:
      a. Use spray equipment that provides controlled application at volume and pressure indicated, measured at nozzle. Adjust pressure and volume to ensure that cleaning methods do not damage surfaces, including joints:
         1) Equip units with pressure gages.
         2) For chemical cleaner spray application, use low pressure tank or chemical pump suitable for chemical cleaner indicated, equipped with nozzle having a cone shaped spray.
         3) For water spray application, use fan shaped spray that disperses water at an angle of 25 to 50 degrees.
         4) For high pressure water spray application, use fan shaped spray that disperses water at an angle of at least 40 degrees.
         5) For heated water spray application, use equipment capable of maintaining temperature between 140 degrees F and 160 degrees F (60 degrees C and 71 degrees C) at flow rates indicated.
         6) For steam application, use steam generator capable of delivering live steam at nozzle.

D. Perform each cleaning method indicated in a manner that results in uniform coverage of all surfaces, including corners, moldings, and interstices, and produces an even effect without streaking or damaging masonry surfaces. Keep wall wet below area being cleaned to prevent streaking from runoff.

E. Perform additional general cleaning, paint and stain removal, and spot cleaning of small areas that are noticeably different when viewed, so cleaned surfaces blend smoothly into surrounding areas.

F. Water Application Methods:
   1. Water soak application: Soak masonry surfaces by applying water continuously and uniformly to limited area for time indicated. Apply water at low pressures and low volumes in multiple fine sprays using perforated hoses or multiple spray nozzles. Erect a protective enclosure constructed of polyethylene sheeting to cover area being sprayed.
   2. Water spray applications: Unless otherwise indicated, hold spray nozzle at least 6 inches (150 mm) from masonry surface and apply water in horizontal back and forth sweeping motion, overlapping previous strokes to produce uniform coverage.

G. Steam Cleaning: Apply steam to masonry surfaces at the very low pressures indicated for each type of masonry. Hold nozzle at least 6 inches (150 mm) from masonry surface and apply steam in horizontal back and forth sweeping motion, overlapping previous strokes to produce uniform coverage.

H. Chemical Cleaner Application Methods: Apply chemical cleaners to masonry surfaces according to chemical cleaner manufacturer's written instructions; use brush or spray application. Do not spray apply at pressures exceeding 50 psi (345 kPa). Do not allow chemicals to remain on surface for periods longer than those indicated or recommended in writing by manufacturer.

I. Rinse off chemical residue and soil by working upward from bottom to top of each treated area at each stage or scaffold setting. Periodically during each rinse, test pH of rinse water running off of cleaned area to determine that chemical cleaner is completely removed:
   1. Apply neutralizing agent and repeat rinse if necessary to produce tested pH of between 6.7 and 7.5.

J. After cleaning is complete, remove protection no longer required. Remove tape and adhesive marks.

3.5 PRELIMINARY CLEANING

A. Removing Plant Growth: Completely remove visible plant, moss, and shrub growth from masonry surfaces. Carefully remove plants, creepers, and vegetation by cutting at roots and allowing remaining growth to dry as long as possible before removal. Remove loose soil and plant debris from open joints to whatever depth they occur.

B. Preliminary Cleaning:
   1. Before beginning general cleaning, remove extraneous substances that are resistant to planned cleaning methods. Extraneous substances include paint, calking, asphalt, and tar:
      a. Carefully remove heavy accumulations of rigid materials from masonry surface with sharp chisel. Do not scratch or chip masonry surface.
      b. Remove paint and sealant with alkaline paint remover:
         1) Comply with requirements.
         2) Repeat application up to two (2) times if needed.
      c. Remove asphalt and tar with solvent type paste paint remover:
         1) Comply with requirements.
         2) Apply paint remover only to asphalt and tar by brush without prewetting.
         3) Allow paint remover to remain on surface for 10 to 30 minutes.
         4) Repeat application if needed.

3.6 CLEANING MASONRY

A. Cold Water Soak:
   1. Apply cold water by intermittent spraying to keep surface moist.
   2. Use perforated hoses or other means that apply a fine water mist to entire surface being cleaned.
   3. Apply water in cycles of 5 minutes on and 20 minutes off.
   4. Continue spraying until surface encrustation has softened enough to permit its removal by water wash, as indicated by cleaning tests.

B. Cold Water Wash: Use cold water applied by low, medium, or high pressure spray.

C. Hot Water Wash: Use hot water applied by low, medium, or high pressure spray.

D. Steam Cleaning: Apply steam at very low pressures not exceeding 80 psi (550 kPa). Remove dirt softened by steam with wood scrapers, stiff nylon or fiber brushes, or cold-water wash, as indicated by cleaning tests.

E. Detergent Cleaning:
   1. Wet surface with water applied by low pressure spray.
   2. Scrub surface with detergent solution using medium soft brushes until soil is thoroughly dislodged and can be removed by rinsing. Use small brushes to remove soil from mortar joints and crevices. Dip brush in solution often to ensure that adequate fresh detergent is used, and that surface remains wet.
   3. Rinse with water applied by high pressure spray to remove detergent solution and soil.

4. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.

F. Mold, Mildew, and Algae Removal:
   1. Wet surface with water applied by low pressure spray.
   2. Apply mold, mildew, and algae remover by brush.
   3. Scrub surface with medium soft brushes until mold, mildew, and algae are thoroughly dislodged and can be removed by rinsing. Use small brushes for mortar joints and crevices. Dip brush in mold, mildew, and algae remover often to ensure that adequate fresh cleaner is used, and that surface remains wet.
   4. Rinse with cold water applied by medium pressure spray to remove mold, mildew, and algae remover and soil.
   5. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.

G. Non-Acidic Gel Chemical Cleaning:
   1. Wet surface with cold water applied by low pressure spray.
   2. Apply gel cleaner in 1/8 inch (3 mm) thickness by brush, working into joints and crevices. Apply quickly and do not brush out excessively, so area is uniformly covered with fresh cleaner and dwell time is uniform throughout area being cleaned.
   3. Let cleaner remain on surface for period recommended in writing by chemical cleaner manufacturer.
   4. Remove bulk of gel cleaner.
   5. Rinse with water applied by low pressure spray to remove chemicals and soil.
   6. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.

H. Nonacidic Liquid Chemical Cleaning:
   1. Wet surface with water applied by low pressure spray.
   2. Apply cleaner to surface in two (2) applications by brush or low pressure spray.
   3. Let cleaner remain on surface for period recommended in writing by chemical cleaner manufacturer.
   4. Rinse with cold water applied by medium pressure spray to remove chemicals and soil.
   5. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.

I. Mild Acid Chemical Cleaning:
   1. Wet surface with cold water applied by low pressure spray.
   2. Apply cleaner to surface in two (2) applications by brush or low pressure spray.
   3. Let cleaner remain on surface for period recommended in writing by chemical cleaner manufacturer.
   4. Rinse with cold water applied by medium pressure spray to remove chemicals and soil.
   5. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.

J. Acidic Chemical Cleaning:
   1. Wet surface with cold water applied by low pressure spray.
   2. Apply cleaner to surface in two (2) applications by brush or low pressure spray.
   3. Let cleaner remain on surface for period recommended in writing by chemical cleaner manufacturer.

K. One-Part Limestone Chemical Cleaning:
   1. Wet surface with water applied by low pressure spray.
   2. Apply cleaner to surface by brush or low pressure spray.

3. Let cleaner remain on surface for period recommended in writing by chemical cleaner manufacturer.
4. Immediately repeat application of one-part limestone cleaner as indicated above over the same area.
5. Rinse with water applied by medium pressure spray to remove chemicals and soil.

L. Two-Part Chemical Cleaning:
1. Wet surface with hot water applied by low pressure spray.
2. Apply alkaline prewash cleaner to surface by brush or roller.
3. Let cleaner remain on surface for period recommended in writing by chemical cleaner manufacturer unless otherwise indicated.
4. Rinse with cold water applied by medium pressure spray to remove chemicals and soil.
5. Apply acidic afterwash cleaner to surface in two (2) applications, while surface is still wet, using low pressure spray equipment, deep nap roller or soft fiber brush. Let neutralizer remain on surface for period recommended in writing by manufacturer unless otherwise indicated.
6. Rinse with cold water applied by medium pressure spray to remove chemicals and soil.
7. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once.

3.7 FIELD QUALITY CONTROL

A. Manufacturer Field Service: Engage paint remover manufacturer's and chemical cleaner manufacturer factory authorized service representatives for consultation and Project site inspection, to perform preconstruction product testing, and provide onsite assistance when requested by Architect. Have paint remover manufacturer and chemical cleaner manufacturer factory authorized service representatives visit site not less than once to observing progress and quality of the work.

3.8 FINAL CLEANING

A. Clean adjacent non-masonry surfaces of spillage and debris. Use detergent and soft brushes or cloths.

B. Remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.

C. Remove masking materials, leaving no residues that could trap dirt.

END OF SECTION 04 01 20

SECTION 04 05 00 - COMMON WORK RESULTS FOR MASONRY

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:
   1. Mortar and grout for masonry assemblies.
   2. Ties and anchors.
   3. Embedded flashing.
   4. Penetrating water repellents.
   5. Miscellaneous masonry accessories.
   6. Cleaning exposed unit masonry surfaces.

B. Related Sections:
   1. Section 04 01 20 - Maintenance of Unit Masonry: Cleaning of Masonry.

1.3 REFERENCE STANDARDS:

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

B. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2023a.

C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.

D. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement; 2022.

E. ASTM A996/A996M - Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement; 2016.

F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2023, with Editorial Revision.

G. ASTM B32 - Standard Specification for Solder Metal; 2020.

H. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction; 2022.

I. ASTM C5 - Standard Specification for Quicklime for Structural Purposes; 2024.

J. ASTM C91/C91M - Standard Specification for Masonry Cement; 2023.

K. ASTM C114 - Standard Test Methods for Chemical Analysis of Hydraulic Cement; Current Edition.

L. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2018.

M. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.

N. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2018.

O. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.

P. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2024.

Q. ASTM C476 - Standard Specification for Grout for Masonry; 2023.

R. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2019, with Editorial Revision (2022).

S. ASTM C780 - Standard Test Methods for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2023.

T. ASTM C1019 - Standard Test Method for Sampling and Testing Grout for Masonry; 2020.

U. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2017 (Reapproved 2023).

V. ASTM D1056 - Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber; 2020.

W. ASTM D2000 - Standard Classification System for Rubber Products in Automotive Applications; 2018.

X. ASTM D2287 - Standard Classification System and Basis for Specification for Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds; Current Edition.

Y. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata (2024).

1.4 DEFINITIONS

A. Very Low Pressure Spray: Under 100 psi .

B. Low Pressure Spray: 100 to 400 psi; 4 to 6 gpm.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Mix design for mortar and grout shall be submitted for review.

C. Supplier’s certificates indicating materials comply with the specifications below. They shall include, but are not necessarily limited to:
   1. Aggregates.
   2. Cement.
   3. Admixtures.

D. Shop Drawings:
   1. For the following:
      a. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

E. Samples for Initial Selection:
   1. Colored mortar.
   2. Weep holes/vents.

F. Samples for Verifications:
   1. For each type and color of the following:
      a. Pigmented and colored-aggregate mortar. Make samples using same sand and mortar ingredients to be used on Project.
      b. Weep holes and vents.
      c. Accessories embedded in masonry.

G. Material Certificates:
   1. For each type and size of the following:
      a. Cementitious materials. Include brand, type, and name of manufacturer.
      b. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
      c. Grout mixes. Include description of type and proportions of ingredients.
      d. Anchors, ties, and metal accessories.

H. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.6 QUALITY ASSURANCE

A. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

B. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 - Project Management and Coordination.

C. Tests and Inspections:
   1. All tests and inspections herein are to be performed by an independent testing laboratory approved by the building official.
   2. Mortar and grout tests:
      a. At the beginning of masonry work, at least one (1) test sample each of mortar and grout shall be taken on three (3) successive working days, then once per week with at least one sample taken for each 5,000 square feet of wall area, or fraction thereof:
         1) Test specimens shall be made in accordance with ASTM C1019 for grout and ASTM C780 for mortar.
         2) Test specimens shall be continuously stored in moist air until tested.
         3) Mortar shall show a compressive strength of not less than 1,800 psi at 28 days. Grout shall show a compressive strength of not less than 2,000 psi at 28 days.

D. Paint Remover Manufacturer Qualifications: Firm having minimum five (5) years' documented experience who regularly engages in producing masonry cleaners, and with factory authorized service representatives who are available for consultation and site inspection, preconstruction product testing, and onsite assistance.

E. Chemical Cleaner Manufacturer Qualifications: Firm having minimum five (5) years' documented experience who is regularly engaged in producing masonry cleaners that have been used for similar applications with successful results, and with factory authorized service representatives who are available for consultation and site inspection, preconstruction product testing, and onsite assistance.

F. Cleaning Program:
   1. Prepare a written cleaning program that describes cleaning process in detail, including materials, methods, and equipment to be used; protection of surrounding materials; and control of runoff during operations. Include provisions for supervising worker performance and preventing damage:
      a. If materials and methods other than those indicated are proposed for any phase of cleaning work, add a written description of such materials and methods, including evidence of successful use on comparable projects and demonstrations to show their effectiveness.

G. Pre-Installation Conference:
   1. Conduct conference at Project site:
      a. Verify masonry cleaning equipment and facilities needed to make progress and avoid delays.
      b. Materials, material application, and sequencing.
      c. Cleaning program.
      d. Coordination with building occupants.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

B. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

C. Deliver pre-blended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store pre-blended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.

D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

PART 2 PRODUCTS

2.1 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
   1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C114.

B. Hydrated Lime: ASTM C207, Type N or S as indicated in masonry section.

C. Portland Cement-Lime Mix: Packaged blend of Portland cement and hydrated lime,complying with specified requirements and containing no other ingredients.

D. Masonry Cement: ASTM C91/C91M.

E. Quicklime: ASTM C5.

F. Lime Putty:
   1. Made from hydrated lime or quicklime:
      a. If made from quicklime, other than processed pulverized quicklime, slake lime and then screen through a No. 16 mesh sieve. Before using, store and protect slaked and screened lime putty for not less than 10 days.
      b. Processed pulverized quicklime shall be slaked for not less than 48 hours, and shall be cool when used.
      c. Lime putty prepared from hydrated lime may be used immediately after mixing.
      d. Lime putty prepared from quicklime or pulverized quicklime shall have a plasticity figure, after slaking and screening, of not less than 200, and shall weigh not less than 83 pounds per cubic foot. Lime putty prepared from hydrated lime shall conform to ASTM C207, Type S.

G. Aggregate:
   1. For mortar: ASTM C144.
   2. For grout: ASTM C404.

H. Admixtures:
   1. Cold Weather Admixture:
      a. Non-chloride, non-corrosive, accelerating admixture complying with ASTM C494/C494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated:
         1) Manufacturers listed whose products meet or exceed the specifications are approved for use in the Work. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.
            (a) BASF Corporation.
            (b) Euclid Chemical.
            (c) GCP Applied Technologies.
         2) Substitutions: Refer to section 01 25 00 - Subsitution Provedures.

I. Water: Potable.

2.2 MORTAR MIXES

A. General:
   1. Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated:
      a. Do not use calcium chloride in mortar.
      b. Use masonry cement or mortar cement mortar unless otherwise indicated.

c. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Pre-Blended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
   1. Manufacturers listed whose products meet or exceed the specifications are approved for use in the Work. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.
   2. Substitutions: Refer to Section 01 25 00 - Subsitution Procedures.

C. Mortar for Unit Masonry: Comply with ASTM C270, Proportion Specification. Provide Type S or Type N as indicated in related Section.
   1. Type S mortar shall have a 28 day compressive strength of not less than 1,800 psi.

D. Mortar shall be made with admixtures that are proportioned, added and mixed in strict accordance with manufacturer's directions.

E. Mortar mix shall be proportioned by volume; one-part portland cement, not less than 1/4-part nor more than 1/2-part lime putty, and sand totaling not less than 2-1/4 nor more than three (3) times sum of volumes of cement and lime used:
   1. Total clay content shall not exceed 2 percent of sand content or six percent 6 percent of cement content.

2.3 GROUT MIXES

A. Grout for Unit Masonry: Comply with ASTM C476.
   1. Grout shall have a 28-day compressive strength of not less than 2,000 psi (14 MPa). Proportion by volume and with sufficient water to produce consistency for pouring without segregation so that grout will flow into masonry joints.
   2. Proportion by volume and with sufficient water to produce consistency for pouring without segregation so that grout will flow into masonry joints.

B. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that complies with TMS 402/602 for dimensions of grout spaces and pour height.
   1. Fine Grout:
      a. One-part portland cement, to which may be added not more than 1/10 part lime putty, and three-parts sand.
      b. Fine grout shall be used for all grout spaces less than 3 inches wide.
   2. Coarse Grout:
      a. One-part portland cement, to which may be added not more than 1/10 part lime putty, three-parts sand, and not less than one-part nor more than two-parts pea gravel (3/8 inch maximum aggregate size).
      b. Coarse grout shall be used in grout spaces 3 inches wide or more.

C. Grout Additive:

2.4 REINFORCEMENT

A. Masonry Joint Reinforcement, General: ASTM A951/A951M.
   1. Masonry joint reinforcement used in exterior walls shall be hot-dipped galvanized, conforming to ASTM A153/A153M, Class B, minimum coating of 1.5 ounce for square foot.

B. Masonry Joint Reinforcement for Veneers Anchored with Seismic Masonry-Veneer Anchors: Single 0.187-inch diameter, hot-dip galvanized, carbon-steel continuous wire.

C. Reinforcing Bars:
   1. Uncoated Steel Reinforcing Bars: ASTM A615/A615M or ASTM A996/A996M, Grade 60 (Grade 420).

D. Reinforcing Bar Positioners:

1. Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Form units from 0.148 inch (3.77 mm) steel wire, hot dip galvanized after fabrication. Provide units designed for number of bars indicated:
2. Manufacturers:
    a. Manufacturers listed whose products meet or exceed the specifications are approved for use in the Work. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.
        1) Heckmann Building Products, Inc.
        2) Hohmann & Barnard, Inc.
        3) Wire-Bond.

2.5 TIES AND ANCHORS

A. General:
    1. Sheet Metal Anchors and Ties - ASTM A1008/A1008M:
        a. Sheet metal anchors and ties used in exterior walls shall be hot-dipped galvanized, conforming to ASTM A153/A153M, Class B.

2.6 MISCELLANEOUS ANCHORS

A. Unit Type Inserts in Concrete: Cast-iron or malleable-iron wedge-type inserts.

B. Dovetail Slots in Concrete: Furnish dovetail slots with filler strips, of slot size indicated, fabricated from 0.034 inch galvanized steel sheet.

2.7 EMBEDDED FLASHING MATERIALS

A. Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and/or Section 07 62 00 - Roof Related Sheet Metal and as follows:
    1. Stainless Steel: ASTM A240/A240M, Type 304, 0.016 inch thick.
    2. Copper: ASTM B370, Temper H00, cold-rolled copper sheet, 16 ounces per square foot weight or 0.0216 inch thick or ASTM B370, Temper H01, high-yield copper sheet, 12 ounces per square foot weight or 0.0162 inch thick.
    3. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.
    4. Fabricate through-wall metal flashing embedded in masonry from copper, with ribs at 3 inch intervals along length of flashing to provide an integral mortar bond:
        a. Products are subject to compliance with requirements; available products that may be incorporated into the Work include, but are not limited to, the following:
            1) Cheney Flashing Company: Cheney Flashing (Dovetail).
            2) Keystone Flashing Company, Inc: Keystone 3-Way Thruwall Flashing.
        b. Substitutions: Refer to Section - 01 25 00 - Subsitution Procedures.
    5. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.
    6. Fabricate through-wall flashing with drip edge unless otherwise indicated. Fabricate by extending flashing 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
    7. Fabricate through-wall flashing with sealant stop unless otherwise indicated. Fabricate by bending metal back on itself 3/4 inch at exterior face of wall and down into joint 1/4 inch to form a stop for retaining sealant backer rod.
    8. Fabricate metal drip edges and sealant stops for ribbed metal flashing from plain metal flashing of same metal as ribbed flashing and extending at least 3 inches into wall with hemmed inner edge to receive ribbed flashing and form a hooked seam. Form hem on upper surface of metal so that completed seam will shed water.
    9. Metal Drip Edge: Fabricate from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.

10. Metal sealant stop: Fabricate from stainless steel. Extend at least 3 inches into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch and down into joint 1/4 inch to form a stop for retaining sealant backer rod.
11. Metal expansion-joint strips: Fabricate from stainless steel to shapes indicated.

B. Flexible Flashing:
1. Use one of the following unless otherwise indicated:
a. Copper-Laminated Flashing: 5 ounces per square foot copper sheet bonded between two (2) layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry:
1) Products are subject to compliance with requirements; available products that may be incorporated into the Work include, but are not limited to, the following:
(a) Hohmann & Barnard, Inc.
(b) Substitutions: Refer to Section - 01 25 00 - Subsitution Procedures.
b. Asphalt-Coated Copper Flashing: 7 ounces per square foot copper sheet coated with flexible asphalt. Use only where flashing is fully concealed in masonry:
1) Products are subject to compliance with requirements; available products that may be incorporated into the Work include, but are not limited to, the following:
(a) Advanced Building Products Inc.
(b) Hohmann & Barnard, Inc.
(c) Substitutions:Refer to Section - 01 25 00 - Subsitution Procedures.
2) Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

C. Application:
1. Unless otherwise indicated, use the following:
a. Where flashing is indicated to receive counterflashing, use metal flashing.
b. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
c. Where flashing is partly exposed and is indicated to terminate at the wall face, use metal flashing with a drip edge with a sealant stop or flexible flashing with a metal sealant stop.
d. Where flashing is fully concealed, use flexible flashing.

D. Solder and Sealants for Sheet Metal Flashings:
1. Solder for stainless steel: ASTM B32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
2. Solder for copper: ASTM B32, Grade Sn50, 50 percent tin and 50 percent lead.

E. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.8 LIQUID SURFACE TREATMENTS

A. Penetrating Water Repellent:
1. Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components, odorless, that penetrates, hardens, and densifies concrete surfaces:
2. Manufacturers:
a. Manufacturers listed whose products meet or exceed the specifications are approved for use in the Work. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.
b. Substitutions: Refer to Section - 01 25 00 - Subsitution Procedures.
3. Basis of Design: Moxie Shield 1400 Surface Sealer or Moxie Shield 1300 Brick Sealer as manufactured by Moxie International Inc.

2.9 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene urethane.

B. Preformed Control Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D2000, designation M2AA-805 or PVC, complying with ASTM D2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).

2.10 CLEANING MATERIALS (VERIFY WITH LOCAL ORDINANCE)

A. Water: Potable.

B. Hot Water: Water heated to a temperature of 140 degrees F to 160 degrees F (60 degrees C to 71 degrees C).

C. Detergent Solution - Job Mixed: Solution prepared by mixing two cups (0.5 L) of tetrasodium pyrophosphate (TSPP), 1/2 cup (125 mL) of laundry detergent, and 20 quarts (20 L) of hot water for every five gallons (20 L) of solution required.

D. Mold, Mildew, and Algae Remover - Job Mixed: Solution prepared by mixing two cups (0.5 L) of tetrasodium pyrophosphate (TSPP), five quarts (5 L) of five percent (5%) sodium hypochlorite (bleach), and 15 quarts (15 L) of hot water for every five gallons (20 L) of solution required.

E. Non-Acidic Gel Cleaner:
   1. Gel formulation, with pH between six (6) and nine (9) that contains detergents with chelating agents and is specifically formulated for cleaning masonry surfaces:
   2. Manufacturers: Specifications are based on products of manufacturers named as the Basis of Design. Manufacturers listed whose products meet or exceed the specifications are approved for use on the Project. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered:
   3. Substitutions: Refer to Section - 01 25 00 - Subsitution Procedures.

F. Non-Acidic Liquid Cleaner:
   1. Mildly alkaline liquid cleaner formulated for removing mold, mildew, and other organic soiling from ordinary building materials, including polished stone, brick, aluminum, plastics, and wood:
   2. Manufacturers: Specifications are based on products of manufacturers named as the Basis of Design. Manufacturers listed whose products meet or exceed the specifications are approved for use on the Project. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered:
   3. Substitutions: Refer to Section - 01 25 00 - Subsitution Procedures.

G. Mild acid cleaner containing no muriatic (hydrochloric), hydrofluoric, or sulfuric acid; or ammonium bifluoride or chlorine bleaches:
   1. Manufacturers: Specifications are based on products of manufacturers named as the Basis of Design. Manufacturers listed whose products meet or exceed the specifications are approved for use on the Project. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered:
   2. Substitutions: Refer to Section - 01 25 00 - Subsitution Procedures.

H. Acidic masonry cleaner composed of hydrofluoric acid or ammonium bifluoride blended with other acids, detergents, wetting agents, and inhibitors:
   1. Manufacturers: Specifications are based on products of manufacturers named as the Basis of Design. Manufacturers listed whose products meet or exceed the specifications

are approved for use on the Project. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered:

2. Substitutions: Refer to Section - 01 25 00 - Subsitution Procedures.

I. Two-part chemical cleaner system consisting of potassium - or sodium hydroxide based, alkaline prewash cleaner and acidic afterwash cleaner that does not contain hydrofluoric acid:
   1. Manufacturers: Specifications are based on products of manufacturers named as the Basis of Design. Manufacturers listed whose products meet or exceed the specifications are approved for use in the Work. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered:
      a. AHI Supply Co.
      b. Diedrich Technologies, Inc.
      c. PROSOCO, Inc.
   2. Substitutions: Refer to Section - 01 25 00 - Subsitution Procedures.

2.11 CHEMICAL CLEANING SOLUTIONS

A. Dilute chemical cleaners with water to produce solutions not exceeding concentration recommended in writing by chemical cleaner manufacturer.

B. Acidic Cleaner Solution for Non-Glazed Masonry and Unpolished Stone:
   1. Dilute acidic cleaner with water to produce hydrofluoric acid content of three percent (3%) or less, but not greater than that recommended in writing by chemical-cleaner manufacturer:
      a. Stones: Use only on unpolished granite, unpolished dolomite marble, and siliceous sandstone.

C. Acidic Cleaner for Galzed Masonry Glazed Masonry and Polished Stone:
   1. Dilute acidic cleaner with water to concentration demonstrated by testing that does not etch, or otherwise damage glazed or polished surface, but not greater than that recommended in writing by chemical-cleaner manufacturer:
      a. Stones: Use only on polished granite and polished dolomite marble.

2.12 MASKING MATERIALS

A. Liquid Strippable Masking Agent:
   1. Liquid, film forming, strippable masking material for protecting glass, metal, glazed masonry, and polished stone surfaces from damaging effects of acidic and alkaline masonry cleaners:
   2. Manufacturers: Specifications are based on products of manufacturers named as the Basis of Design. Manufacturers listed whose products meet or exceed the specifications are approved for use on the Project. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered:
      a. American Building Restoration Products, Inc.
      b. Price Research, Ltd.
      c. PROSOCO, Inc.
   3. Substitutions: Refer to Section - 01 25 00 - Subsitution Procedures.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

A. Protection of Masonry:
   1. During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress:
      a. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.

b. Where one wythe of multi-wythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

B. Stain Prevention:
1. Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry:
a. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
b. Protect sills, ledges, and projections from mortar droppings.
c. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
d. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

C. Cold-Weather Requirements:
1. Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 402/602:
a. Cold-weather cleaning: Use liquid cleaning methods only when air temperature is 40 degrees F and higher and will remain so until masonry has dried, but not less than 7 days after completing cleaning.

D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 402/602.

3.2 COORDINATION

A. Build openings and chases for heating, plumbing, electrical ducts, pipes, and conduits into masonry walls as necessary. Install bolts, toggles, flashings, beams, anchors, hangers, nailing strips, wall plugs, and frames as necessary:
1. Coordinate related work incorporating installation of work to prevent subsequent cutting and patching.
2. Coordinate installation of steel reinforcement for reinforced masonry.
3. Coordinate dampproofing, waterproofing, and air infiltration membrane activities with masonry construction.
4. Coordinate placement of concrete in masonry beams, lintels, soffits, and pilasters.

3.3 EXAMINATION

A. Examine conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the work:
1. For the record, prepare written report, endorsed by installer, listing conditions detrimental to performance of the work.
2. Verify foundations are within tolerances specified.
3. Verify reinforcing dowels are properly placed.
4. Verify substrates are free of substances that impair mortar bond.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation after correcting unsatisfactory conditions.

3.4 MORTAR AND GROUT

A. Mixing Mortar and Grout
1. Accurately measure materials in suitably calibrated devices; shovel measurements are not acceptable. Each 94 pound sack of Portland cement will be considered as 1 cubic foot.

2. Place sand, cement, and water in mixer, in that order, and mix for at least 2 minutes. Add lime putty and continue mixing as long as necessary to secure a uniform mass, but in no case less than 10 minutes.
3. Use mixers of at least o1 sack capacity; batches requiring fractional sacks will not be permitted unless cement is weighed for each batch.

B. Grouting Procedures
1. As specified in Related Section(s).

C. Retempering
1. When necessary to retemper mortar, add water and remix; retempering by dashing water over mortar will not be permitted.
2. Any mortar that is unused within 30 minutes after initial mixing and any mortar that has begun to set shall not be used.

D. Defective Mortar or Grout
1. Should the strength of mortar or grout fall below that specified, remainder of Work shall be adjusted to reach required strength. Work in place representing inferior grout and mortar and indicating a strength less than the minimum specified shall be tested by taking and testing core samples. Number and location of cores shall be determined by Structural Engineer.
2. Should compression tests of cores fail to meet required strength, masonry shall be deemed to be defective and shall be removed and replaced at no cost to Owner.
3. Costs relative to taking and testing of core samples shall be paid by Owner and will be deducted from Contract amount. Cost of patching core holes shall be borne by Contractor.

3.5 INSTALLATION, GENERAL

A. Construct masonry veneer in compliance with TMS 402/602.

B. Thickness: Build single wythe walls to actual widths of masonry units, using units of widths indicated.

C. Build chases and recesses to accommodate items specified in this and other Sections.

D. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

E. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

F. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures:
1. Mix units from several pallets or cubes as they are placed.

G. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

H. All masonry shall be laid true, level, plumb, and as indicated on Drawings.

3.6 TOLERANCES, GENERAL

A. Dimensions and Locations of Elements:
1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:
1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.

2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:
1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch; do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
2. For exposed bed joints, do not vary from bed joint thickness of adjacent courses by more than 1/8 inch .
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.7 LAYING MASONRY, GENERAL REQUIREMENTS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond. Do not use units with less than nominal 4 inch (100 mm) horizontal face dimensions at corners or jambs.

C. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

D. Built-in Work: As construction progresses, build in items specified. Fill in solidly with masonry around built-in items.

E. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.

G. Fill all cores in hollow CMU with grout.

3.8 MORTAR BEDDING AND JOINTING

A. Lay masonry units as indicated in appropriate Section.

B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

C. Cut joints flush for masonry walls to receive plaster or other direct applied finishes (other than paint) unless otherwise indicated.

D. Cut joints flush where indicated to receive waterproofing, cavity wall insulation, or air barriers unless otherwise indicated.

3.9 MASONRY JOINT REINFORCEMENT

A. Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).
   1. Space reinforcement not more than 16 inches o.c.
   2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
   3. Provide reinforcement not more than 8 inches (above and below wall openings and extending 12 inches beyond opening in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T shaped units.

D. Provide continuity at corners by using prefabricated L shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.10 ANCHORED VENEERS

A. Ties and Anchors: Extend ties and anchors a minimum 1-1/2 inches into veneer but with at least a 5/8-inch cover on outside face.

B. Provide not less than 1/2 inch of airspace between back of masonry veneer and face of masonry:
   1. Keep airspace clean of mortar droppings and other materials during construction. Bevel beds away from airspace, to minimize mortar protrusions into airspace. Do not attempt to trowel or remove mortar fins protruding into airspace.

3.11 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete where masonry abuts or faces structural steel or concrete to comply with the following:
   1. Provide an open space not less than 2 inches wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
   2. Anchor masonry with anchors embedded in masonry joints and attached to structure.Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.
   3. Anchor masonry with anchors embedded in masonry joints and attached to structure.

B. Anchor veneers to concrete masonry backup with masonry anchor ties and veneer ties as indicated on the Drawings. Comply with the following requirements:
   1. Embed anchor ties in masonry joints as indicated on Drawings.
   2. Fasten veneer ties to masonry backup through loops of anchor ties projecting from masonry surface.
   3. Space anchors ties as indicated, but not more than 12 inches o.c. vertically and 12 inches o.c. horizontally, with not less than one (1) anchor for each 1 square foot of wall area. Install additional anchors at openings and at intervals, not exceeding 8 inches (203 mm), around perimeter.

3.12 ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to wall framing and concrete backup with seismic masonry-veneer anchors to comply with the following requirements:
   1. Fasten screw-attached and seismic anchors through sheathing to wall framing and to concrete backup with metal fasteners of type indicated. Use two (2) fasteners unless anchor design only uses one (1) fastener.
   2. Insert slip-in anchors in metal studs as sheathing is installed. Provide one (1) anchor at each stud in each horizontal joint between sheathing boards.

3. BIA Technical Notes 28B recommends 2 inches (50 mm) of air space. Wider air spaces require closer tie spacing.
4. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
5. Space anchors as indicated, but not more than 18 inches o.c. vertically and 24 inches o.c. horizontally, with not less than one (1) anchor for each 2 square feet of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 8 inches, around perimeter.
6. Space anchors as indicated, but not more than 16 inches o.c. vertically and 24 inches o.c. horizontally with not less than one (1) anchor for each 3-1/2 square feet of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 36 inches, around perimeter.

3.13 CONTROL AND EXPANSION JOINTS

A. Install expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span expansion joints without provision to allow for in-plane wall or partition movement.

B. Provide horizontal, pressure-relieving joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 07 92 00 - Joint Sealants, but not less than 3/8 inch:
   1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.14 LINTELS

A. Provide steel lintels where indicated.

B. Provide masonry lintels where shown and where openings of more than 24 inches (610 mm) for block size units are shown without structural steel or other supporting lintels.

C. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.15 FLASHING, WEEPS, CAVITY DRAINAGE, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.
   1. Install flashing as follows unless otherwise indicated:
      a. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
      b. At masonry-veneer walls, extend flashing through veneer, across air space behind veneer, and up face of sheathing at least 8 inches; with upper edge tucked under building paper or building wrap, lapping at least 4 inches.
      c. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
      d. Install metal drip edges and sealant stops with ribbed sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant for application indicated.
      e. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.
      f. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal flashing termination.
   2. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.

B. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

C. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:
   1. Use specified weep/vent products to form weep holes.
   2. Use wicking material to form weep holes above flashing under brick sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
   3. Space weep holes 24 inches o.c. unless otherwise indicated.
   4. Retain last subparagraph above if weep holes other than plastic tubing or wicking are used. Retain first subparagraph below if plastic tubing or wicking is used.
   5. Space weep holes formed from plastic tubing or wicking material 16 inches o.c.
   6. Trim wicking material flush with outside face of wall after mortar has set.

D. Place pea gravel in cavities as soon as practical to a height equal to height of first course above top of flashing, but not less than 2 inches, to maintain drainage.

E. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" article.

F. Install vents in head joints in exterior wythes at spacing indicated. Use specified weep/vent products to form vents:
   1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.16 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.

B. Inspections:
   1. Special inspections according to Level C in TMS 402/602:
      a. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
      b. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
      c. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One (1) set of tests.

D. Testing Frequency: One (1) set of tests for each 5,000 square feet (464 sq. m) of wall area or portion thereof.

E. Mortar Test (Property Specification): For each mix provided, according to ASTM C780. Test mortar for compressive strength.

F. Grout Test (Compressive Strength): For each mix provided, according to ASTM C1019.

G. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C780.

3.17 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: During construction, minimize any mortar or grout stains on the wall. Immediately remove any staining or soiling that occurs:
   1. For precision or textured units, except as noted below, clean masonry by dry brushing before tooling joints.
   2. For burnished, glazed, or pre-finished concrete masonry units, immediately remove any green mortar smears or soiling with a damp sponge.

D. Final Cleaning - After mortar is thoroughly set and cured, clean exposed masonry as follows:
   1. After mortar is thoroughly set and cured, clean exposed masonry:
      a. Remove large mortar particles by hand with wooden paddles and non-metallic scrape hoes or chisels.
      b. Test cleaning methods on sample wall panel; leave 1/2 of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
      c. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
      d. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
      e. Clean brick by bucket-and-brush hand-cleaning method described in "BIA Technical Notes 20."
      f. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
      g. Do not use acids on concrete masonry units.
      h. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

E. At completion of masonry work, remove all scaffolding and equipment used during construction, and remove all debris, refuse, and surplus masonry material from the site:
   1. Comply with Construction Waste Management plan.

3.18 WATER REPELLENT APPLICATION

A. Cleaning shall be complete and accepted by Architect, and wall surfaces shall be thoroughly dry prior to application.

B. Apply water repellent in strict accordance with water repellent manufacturer's instructions.

END OF SECTION 04 05 00

SECTION 04 20 00 - UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Face brick, including solids.

1.3 DEFINITIONS

A. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 RELATED WORK

A. Section 01 45 23 - Testing and Inspecting Services.

B. Section 05 50 00 – Metal Fabrications. Steel masonry lintels.

C. Section 07 11 00 – Bituminous Damp proofing.

D. Section 07 21 00 – Thermal Insulation.

E. Section 07 92 00 – Joint Sealants.

F. Section 09 90 00 – Paintings and Coatings.

G. All Sections of Work built-in, adjacent to, or applied to unit masonry Work.

1.5 REFERENCES

A. ASTM International (ASTM)
1. A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron & Steel Hardware.
2. A307 - Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
3. A615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
4. A706 - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement.
5. C67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
6. C90 - Standard Specification for Loadbearing Concrete Masonry Units.
7. C140 - Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units.
8. C144 - Standard Specification for Aggregate for Masonry Mortar.
9. C150, Standard Specification for Portland Cement.
10. C207 - Standard Specification for Hydrated Lime for Masonry Purposes.
11. C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale).
12. C270 - Standard Specification for Mortar for Unit Masonry.
13. C331 - Standard Specification for Lightweight Aggregates for Concrete Masonry Units.
14. C332 - Standard Specification for Lightweight Aggregates for Insulating Concrete.
15. C404 - Standard Specification for Aggregates for Masonry Grout.
16. C476 - Standard Specification for Grout for Masonry.
17. C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.

18. C652 - Standard Specification for Hollow Brick (Hollow Masonry Units Made From Clay or Shale).
19. C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
20. C979 - Standard Specification for Pigments for Integrally Colored Concrete.
21. D226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
22. D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
23. E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

B. Underwriters' Laboratories, Inc. (UL)

1.6 QUALITY ASSURANCE

A. Where requirements of this Section are in conflict with requirements noted on the Structural Drawings, the Structural Drawings shall take precedence. Refer to Structural Drawings for information on load-bearing CMU walls.

B. Fire Performance Characteristics: Where indicated or required, provide materials and construction which are identical to assemblies whose fire endurance has been determined by testing in compliance with ASTM E119 by U.L. or other recognized testing and inspection organization or by other means, acceptable to authority having jurisdiction.

C. Masonry Cleaning: Workers shall have minimum 5 years of masonry cleaning experience, and shall be approved by cleaner manufacturer prior to application of cleaning material, and shall meet with cleaner manufacturer for demonstration and instruction s for use of product prior to application.

D. Perimeter Walk-Around: Daily perimeter walk-around the exterior side of the masonry by the GC and or masonry Subcontractor at the end of each Work day as a visual inspection looking for obvious issues or flaws concerning colors, finishes, workmanship, protection of Work.

E. Single Source Responsibility:
1. For Masonry Units: Obtain masonry units of uniform texture and color, or a uniform blend within the accepted ranges for those characteristics, from one (1) manufacturer for each different product required for each continuous surface or visually related surfaces.
2. For Mortar and Grout Materials: Brands of cementitious materials and admixtures, and the source of supply of sand and aggregates shall remain the same throughout the Work where exposed to view and where not scheduled to receive a subsequently applied finish, i.e. parging, painting, etc., unless directed otherwise in writing by the Architect.
3. Contractor's Responsibility: Contractor performing Work of this Section shall be responsible for coordinating with others performing Work which is built-in or adjacent to unit masonry Work.

1.7 SUBMITTALS

A. Product Data: Submit schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, product variations, and accessories.

B. Samples: Two (2) sets of color chips representing manufacturer's full range of available colors and textures of each face brick for Architect's selection and approval.

C. Sample Panel(s):
1. Do not start masonry until Architect has approved samples.

2. Sample panel shall be 6 feet long by 8 feet high showing selected color range and texture, bonding, joint shape, and quality of workmanship. Include a brick and expansion joint, and any specialty details, such as reveals, soldier courses, etc. Include mock-up of installation of thru-wall flashing at foundation sill and lintel above openings, window jambs and sills.
3. A separate panel for each type of masonry used is required.
   Sample panel(s) shall remain at the jobsite until all masonry is completed.
   Installed materials shall be visible and integrated into adjacent materials.
4. Brace and support as required to withstand structural wind loads.

D. Certification: Submit manufacturer's affidavit that materials used in Project contain no asbestos.

E. Mortar and Grout Mix Designs: Submit two (2) copies of proposed mortar and grout mix designs to Owner's testing laboratory.

F. Dallas Green Building Code Submittals
1. A completed Green Building Reporting Form (GBRF) with a separate line item completed for each applicable product.
2. Cut Sheets: Product cut sheets for each product confirming that the submitted products are the products installed as part of the Work.
3. Validation: Provide validation for each product according to the Action Submittals requirements of Section 01 8113 Sustainable Design and Construction.
   a. Recycled Content.
   b. Indigenous Materials.
   c. Recyclable materials.
   d. Re-used materials.

4. Provide material mass, volume or cost for the materials included in the contractor's or subcontractor's Work. Material cost does not include costs associated with labor and equipment.

1.8 PRE-INSTALLATION CONFERENCE

A. Refer to Section 01 31 00 – Project Management and Coordination.

1.9 MOCKUPS

A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
1. Build mockups for each type of exposed unit masonry construction in sizes approximately 72 inches long by 72 inches high by full thickness, including face and backup wythes and accessories.
   a. Include a sealant filled joint at least 16 inches (long in each mockup.
   b. Include lower corner of window opening, framed with stone trim, at upper corner of exterior wall mockup. Make opening approximately 12 inches wide by 16 inches high.
   c. Include through wall flashing installed for a 24 inch length in corner of exterior wall mockup approximately 16 inches down from top of mockup, with a 12 inch length of flashing left exposed to view (omit masonry above half of flashing).
   d. Include studs, sheathing, water resistive barrier, sheathing joint and penetration treatment, air barrier, veneer anchors, flashing, cavity drainage material, and weep holes in exterior masonry veneer wall mockup.
   e. Include each type of masonry on one face of interior unit masonry wall mockup.

2. Where masonry is to match existing, erect mockups adjacent and parallel to existing surface.
3. Clean one/half of exposed faces of mockups with masonry cleaner as indicated.

4. Protect accepted mockups from the elements with weather resistant membrane.
5. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.
    a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
    b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
6. Mock up shall be demolished.

1.10 TESTS AND INSPECTIONS

A. Materials and installation of masonry shall be subject to testing and inspection by an independent testing laboratory. Such tests and inspections shall not relieve Contractor of responsibilities for providing materials and procedures which comply with Contract Documents. Promptly remove and replace materials which do not comply.

B. Owner will select Inspection and Testing Laboratory and will pay for all Work required by Inspection and Testing Laboratory.

1.11 DELIVERY, STORAGE AND PROTECTION

A. Deliver and store materials in dry protected areas off ground. Keep free of stain or other damage before, during and after installation. Replace any damaged material at no cost to Owner.

B. During freezing weather, protect masonry units with tarpaulins or other suitable material. Keep free of stain or other damage before, during and after installation. Replace damaged material at no cost to Owner.

C. Protect reinforcement and accessories from elements.

1.12 SITE CONDITIONS

A. Cold Weather Protection:
1. No masonry shall be laid when the temperature of the outside air is below 40 degrees F, unless protection measures are employed and pre-approved by the Architect.
2. Protection measures for cold weather erection include maintaining space and masonry unit temperatures of at least 40 degrees F for 48 hours prior to and after erection.

B. Hot Weather Protection:
1. When the mean daily temperature exceeds 100 degrees F or exceeds 90 degrees F with a wind velocity greater than 8 mph, fog spray all newly constructed masonry until damp, at least three (3) times a day until the masonry is three (3) days old.

1.13 BRACING OF MASONRY DURING ERECTION

A. All masonry shall be adequately braced at all times during erection.

1.14 COORDINATION

A. Openings and chases for heating, plumbing, electrical ducts, pipes, and conduits shall be built into masonry walls as required. Provide for installation of bolts, toggles, flashings, beams, anchors, hangers, nailing strips, wall plugs, and frames as required. Consult other trades in advance and make provisions for installation of their Work to avoid cutting and patching.

Coordinate installation of steel reinforcement for reinforced masonry. Coordinate placement of concrete in masonry beams, lintels, soffits, and pilasters.

B. Contractor performing Work of this Section shall be responsible for and coordinate with work of Section 07 11 00, Dampproofing Above Grade and all Sections of Work built-in, adjacent to, or applied to unit masonry Work.

1.15 WARRANTY

A. Warrant the Work specified herein for one (1) year against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials or workmanship.

B. Defects shall include, but not be limited to, the following:
   1. Noticeable deterioration of unit or mortar finish.
   2. Chalking or dusting excessively.
   3. Changing color in irregular fashion.
   4. Cracking or spalling.
   5. Releasing from substrate.
   6. Staining or discoloring, including efflorescence.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Blackson Brick Co. Manufacturers must have a minimum of five (5) years experience manufacturing products equal to those specified and comply with requirements of Division 1 regarding substitutions to be considered.
   1. Face Brick Manufacturers: Subject to compliance with requirements, provide products of one of the following:
      a. ACME.
      b. Forterra.
      b. Interstate Brick.
      c. Kansas Brick and Tile.

2.2 MATERIALS

A. Face Brick: King Size face brick complying with the requirements of ASTM C216, Grade SW, Type FBX as selected by Architect and purchased by allowance specified in Section 01 21 00, including solids and special shapes as indicated or required (all colors).

B. Mortar:
   1. Materials: (Unless stated otherwise on Structural Drawings)
      a. Portland Cement: ASTM C150, Type 1.
      b. Hydrated Lime: ASTM C207, TYPE “N”, typical. Use TYPE “S” for load-bearing masonry.
      c. Aggregate: Sand conforming to ASTM C144.
      d. Water: Clean and potable.
      e. Admixtures For Mortar:
         1) General: Do not use calcium chloride
         2) Concrete Masonry Units: Spectrum Mortar Color or Architect approved equal.
         3) Face Brick: Spectrum Mortar Color or Architect approved equal.
         4) Integral Water Repellant (In mortar of exterior exposed CMU): “Dry- Block Mortar Admixture” integral water repellant admixture as manufacturer by Grace

Construction Packaging (gcp) or equal. Note: Water repellent block admixture and mortar admixture are not interchangeable.

2. Mix Design: (Proportions by volume) (Unless stated otherwise on Structural Drawings)
   a. Typical, Non-load bearing masonry
      1) Type: ASTM C270, Type “N.”
      2) Proportions: 1 part cement, 1 part hydrated lime and 6 parts sand to provide a compressive strength of 750 psi in 28 days. Do not use calcium chloride.

   b. Load bearing structural masonry
      1) Type: ASTM C270, Type “S.”
      2) Proportions: 1 part cement, 1/2 part hydrated lime and 4-1/2 parts sand to provide a compressive strength of 1800 psi in 28 days. Do not use calcium chloride.

C. Grout:
   1. Materials: (Unless stated otherwise on Structural Drawings)
      a. Hydrated Lime: ASTM C207, TYPE “S.”
      b. Portland Cement: ASTM C150, Type 1.
      c. Water: Clean and potable
      d. Aggregates:
         1) Course aggregate shall conform to ASTM C404.
         2) Fine aggregate shall conform to ASTM C144.

   2. Mix Design: (Unless stated otherwise on Structural Drawings)
      a. Comply with ASTM C476 to provide a compressive strength of 2,500 psi in 28 days, unless noted otherwise. Do not use calcium chloride.
         1) Fine Grout: Fine grout conforming to ASTM C476 and consisting of 1 part Portland cement, 0 to 1/10 part lime and 2-1/4 to 3 parts sand by volume.
         2) Course Grout Mix: Course grout conforming to ASTM C476 and consisting of 1 part Portland cement, 0 to 1/10 part lime and 2-1/4 to 3 parts sand, and 1 to 2 parts course aggregate.

D. Reinforcement, Anchors and Tie Systems:
   1. General: Reinforcement used in all wythes shall be galvanized after fabrication in accordance with ASTM A153, Class B-2.
   2. Approved Manufacturers include the following:
      a. Heckmann Building Products
      b. Hohmann & Barnard, Inc
      c. Wire-Bond

   3. At solid multiple wythe masonry walls and single wythe masonry walls, (Interior partitions) use #9 gauge truss type reinforcing. Pre-fab corners and tees shall be used at all wall corners and intersections; width shall be two (2) inches less than nominal thickness of walls. Hohmann & Barnard "120 Truss-Mesh" at single wythe; "230 Ladder-Tri-Mesh" at multiple, or Architect approved equal.
   4. At Double Wythe Cavity Walls with Insulation Board: Use Hot-dipped galvanized, #9 gauge truss type with 3/16 inch adjustable pintle wall ties. Width of truss reinforcement shall be 2 inches less than the nominal thickness of wall. 3/16 inch wall tie double eye sections welded at 16 inches o.c. extended as required for insulation thickness. Pre fab corners and tees shall be used at all wall corners and intersections. Hohmann & Barnard, Inc. "270 Ladder Eye-Wire", or Architect approved equal.
   5. At Masonry Anchored to Steel Spandrel Beam and Columns: Hot-dipped galvanized DW-10HS and V-Tie manufactured by Hohmann & Barnard, Inc. or Architect approved equal. Anchors detailed on Structural Drawings supersede.

6. At Veneer Brick Anchored to Light Gauge Steel Framing: Hot-dipped galvanized, 2 Seal Tie System utilizing self-tapping screw for steel studs with 5/8 inch barrel length, and 4 inch triangle wire tie for 2 inch cavity manufactured by Hohmann & Barnard, Inc. or Architect approved equal. Anchors detailed on structural drawings supersede. Attachment screws shall be corrosion resistant type as recommended by manufacturer to suit application. Adjust wire tie size as required to conform with cavity depth if other than 2 inch.
7. Control Joint Anchor: Equal to Hohmann & Barnard, Inc.
8. Corrugated Wall Tiles: Not acceptable under any circumstances.

E. Precast Concrete U-Lintels
1. Concrete Materials:
   a. Portland Cement: ASTM C150 Type I or III, gray color.
   b. Aggregates: ASTM C33.
   c. Water: potable
   d. Admixtures: Shall not contain calcium chloride or chloride ions

2. Reinforcing:
   a. Deformed Reinforcement: ASTM A615 Grade 40 or 60.
   b. Prestressing Strand: ASTM A416 270 ksi LL.

3. Fabrication:
   a. Unless specified otherwise, conform to PCI MNL-116.
   b. U-lintel units 14 feet in overall length and shorter shall be made of concrete with a minimum strength of 3500 psi at 28 days.
   c. U-lintel units exceeding 14 feet in overall length shall be made of concrete with a minimum strength of 6000 psi at 28 days and shall be prestressed concrete.
   d. Units shall be sand block finish except prestressed, 6 inch wide, and 12 inch wide U-lintels shall be smooth form finished.
   e. Tolerances shall be per PCI MNL-116
   f. Minor patching in plant is acceptable provided structural adequacy of units is not impaired

4. Acceptable Product/Manufacturer: Cast-Crete High Strength Precast Concrete U-lintels as manufactured by Cast-Crete, Tampa, FL (800) 999-4641, and locally distributed by Headwaters, (713) 365-9077.

F. Block Insulation:
1. Rigid Core Inserts:
   a. Type: “U” shaped insulation inserts conforming to ASTM C578, replacing Federal Specification (FS) HH-I-524C, Type I, specification for Preformed Cellular Polystyrene Thermal Insulation.
   b. Sizes: As required for 6 inch, 8 inch, 10 inch, and 12 inch blocks as shown or required.
   c. Approved Product/Manufacturer: Korfil Insulation Inserts manufactured by Concrete Block Insulating Systems (CBIS), West Brookfield, MA; (800) 628-8476, or Architect approved equivalent.

2. Loose Core Fill: Loose perlite or vermiculite insulation conforming to ASTM C332, Standard Specification for Lightweight Aggregates for Lightweight Concrete, such as Zonolite manufactured by Siplast, Irving, TX; (800) 922-8800, or Architect approved equivalent. Loose fill insulation shall be certified asbestos-free.
3. Foamed-In Place Block Insulation:
   a. Type: Two (2) component system consisting of amino-plast resin and a catalyst foaming agent surfactant.
   b. Features:
      1) Designed to completely fill irregular or hard-to-reach spaces.

2) Can be installed in both new and existing concrete masonry unit construction.
3) Excellent energy and sound insulation values.
4) No settling or expansion after installation.
5) Superior fire and safety performance.
6) No CFC's or HFC's.
7) Safe for the environment.
8) Approved Products/Manufacturers: "Core-Fill 500" manufactured by Tailored Chemical Products, Inc., Longview, TX; (800) 256-3626, Core Foam Masonry Foam Installation by CfiFoam; (434) 546-3632 or Architect approved equivalent.

4. Sand Fill: Clean, dry sand of type recommended to suit application.

G. Miscellaneous Materials: (As shown or required)
1. Reinforcing Steel: ASTM A615, Grade 60.
2. Forms: Form grade plywood with wood studs and wales as required.
3. Shores: Patented shores of design and manufacture sufficient to safely support imposed loads.
4. Premolded Filler: Fibrous mastic strips containing 35 percent to 50 percent asphaltic impregnation, ASTM D1751.
5. Flashing Cement: "Nerva-plast" cold setting mastic manufactured by Nervastral, Inc., or Architect approved equal.
6. Building Felt: No. 15 asphalt saturated felt, ASTM D226.
7. Dovetail Anchors: 16 gauge galvanized dovetail corrugated masonry anchor, 1 inch x 3-1/2 inch manufactured by Heckman Building Products, Inc., Hohmann & Barnard, Inc., Masonry Reinforcing Corporation of America, or Architect approved equal.
8. Steel Shapes and Plates: As shown on drawings and specified in Section 05 50 00, Metal Fabrications.
9. Headed Stud Anchor: Welded by full-fusion process as furnished by TRW Nelson Stud Welding Division, or Architect approved equal.
10. Bolts: ASTM A307. Furnish with carbon steel washers.
11. Deformed Bar Anchors: Welded by full-fusion process as furnished by TRW Nelson Stud Welding Division, or Architect approved equal.
12. Reinforcing Bars to be Welded: ASTM A706.
13. Cavity Drainage Protection: 2 inch thick by 10 inch high by 5 feet long recycled polyester/ polyethylene mesh, trapezoidal-shaped, continuous at foundation, at heads above openings, and shelf angles as indicated on drawings. Provide Mortar Net™ manufactured by Mortar Net Solutions, Burns Harbor, IN; (800) 664-6638, or Architect approved equal.
14. Masonry Color: Iron oxide pigment conforming to ASTM C979 in color(s) selected by Architect, shall be inert, stable to atmospheric conditions, sunfast, weather resistant, alkali resistant, water insoluble, and free of fillers and extenders, as manufactured by ChemSystems, Inc., Davis Colors, Solomon Grind-Chem Service, Inc., or Architect approved equal.
15. Weep Hole Vents: Injection molded vent made from flexible polyvinyl chloride in an offset "T" shape, inserted in head joints, the slotted leg of the vent allows air to pass in and out allows water to weep out and prevents water from penetrating in manufactured by Williams-Goodco, Phone: 800-521-9594 or 248-643-6400 or Email: Wilpro@williamsproducts.net. Weep hole vents shall be sized to match masonry (may require custom sizing).

2.3 MASONRY STRENGTH

A. Ultimate compressive strength of masonry as required by design and determined by prism tests shall not be less than 2,500 psi, unless stated otherwise in Structural Drawings.

2.4 MASONRY CLEANING MATERIALS

A. Detergent Cleaner: Bucket and brush hand cleaning method, BIA Technical Notes 20.

B. Proprietary Acidic Cleaner: Cleaner designed for removing mortar/grout stains, efflorescence, and construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Diedrich Technologies, Inc.
      b. PROSOCO, Inc.
      c. AHI Supply.

C. The following products based on AHI Supply TexClean products are intended as a guide only and does not preclude the contractors use of equal products by listed manufacturers. Consult manufacturer prior to application for any questions or inconsistencies.

Substrate	Color/Type	Cleaning Solution
Brick	Red	Tex Clean Masonry Cleaner
	Light	Tex Tral Masonry Cleaner
	Dark	Tex Tral Masonry Cleaner
	Pavers	Tex Clean Masonry Cleaner
	Glazed	Tex Tral Masonry Cleaner
CMU	Split Face	Tex Tral Masonry Cleaner
	Burnished/Ground Face	Tex Tral Masonry Cleaner
Architectural Concrete	Natural Color/Smooth	Tex Tral Masonry Cleaner
	Textured	Tex Clean Masonry Cleaner
Stone Construction	Cast Stone	Tex Tral Masonry Cleaner
	Arriscraft	Tex Tral Masonry Cleaner
	Limestone (Unpolished)	Tex Tral Masonry Cleaner

PART 3 - EXECUTION

3.1 FORMS AND SHORES

A. Provide forms and shores sufficiently strong and rigid as required to support soffits, beams, and lintels during construction.

B. Build forms to conform to shape, line, and dimension of masonry members as detailed, substantial and sufficiently tight to prevent leakage of mortar, grout or concrete. Properly brace or tie together so as to maintain position and shape.

3.2 PREPARATION OF MATERIALS

A. Concrete Masonry Units:
   1. Where cutting is required, masonry shall be cut with a sharp masonry saw.
   2. Ensure concrete masonry units to receive sand fill are ready for filling and cutouts are protected from material spillage.

B. Brickwork: Dampen brick before laying in a manner consistent with the nature of the brick, the mortar, and the weather conditions.

C. Mortar and Grout:
   1. Use suitable containers for material measurement. Measuring sand by the shovel is not acceptable.
   2. Thoroughly machine mix a minimum of five (5) minutes after all materials are in mixer.
   3. Consistency will completely fill all spaces intended to receive grout.
   4. Use within 2-1/2 hours of initial mixing.
   5. Mortar or grout shall not be used if curing has progressed to yield a stiff consistency.

D. Reinforcement:
   1. Reinforcement shall be free from loose rust and other coatings that would reduce the bond.
   2. Cut accurately to length and bend by such methods as will prevent injury to the material.
   3. Straighten out kinks or bends.

E. Flashing:
   1. Locations: Install in exterior walls to divert moisture within walls to exterior surfaces.
   2. Bed Joints: Coordinate Work with Division 4, Masonry. Install flashings between two (2) thin layers of masonry mortar without increasing thickness of mortar joint. Keep outer edge of flashing material back from face of masonry.
   3. Adjacent Work: Protect Work by masking, covering, or other precautionary methods. Remove protection when no longer necessary.
   4. Separate copper flashing from dissimilar materials.
   5. Protect membrane flashing from overexposure to direct sunlight.

3.3 INSTALLATION

A. General:
   1. Do not use chipped or cracked concrete masonry units (CMU) and face brick, where exposed to view.
   2. Use masonry saws to cut and fit exposed units.
   3. Exposed masonry at exterior corners shall be solid units.
   4. Clean surface of masonry smooth and free from projections which might puncture or otherwise damage flashing material.
   5. Place through-wall flashing as follows:
      a. Place on bed of mortar and cover with mortar.
      b. Provide at steel columns and beams in exterior masonry walls and elsewhere as indicated on the drawings or required.
      c. Install asphalt laminated copper membrane as base flashing at all exterior cavity walls below weep holes.
      d. Install at material transitions inside exterior cavity walls, roof edge/exterior wall transitions, masonry joints (control/expansion) inside exterior cavity walls, exterior wall sill/weep conditions, exterior door and window frame perimeters, roof deck/exterior wall transitions, exterior wall penetrations (i.e. pipe, conduit, ducts,

etc.). Provide membrane at all joints, holes, gaps or openings to ensure a continuously sealed building envelope.

6. Lay masonry units plumb, true to line, and with level courses accurately spaced within allowable tolerances.
7. Do not furrow bed joints.
8. Stop off horizontal run by racking back in each course; toothing is not permitted.
9. Adjust units to final position while mortar is soft and plastic.
10. If units are displaced after mortar has stiffened, remove, clean joints and units and re-lay with fresh motor.

11. When joining fresh masonry to set or partially set masonry:
    a. Remove loose masonry units and mortar
    b. Clean and lightly wet exposed surface of set masonry prior to laying fresh mortar.

B. Metal Door Frames: Fill jamb frames solid with mortar. Build in anchors.

C. Lintels and Bond Beams: Provide reinforced unit type, except where steel lintels are shown. Use reinforcing bars as shown on the drawings. Completely fill in lintel block and bond beams with grout. Provide 8 inch bearing at end of lintels.

D. Corners: Connect corners with No. 9 galvanized wire tie using one tie for each 4 inches of nominal wall thickness.

E. Partition Tops: Allow space at top of horizontal spanning walls for compressible joint back-up and sealant as specified in Sealant section. Anchor top of walls to deck or structure.

F. Mortar Beds:
1. Place mortar in a manner which will result in the development of adequate bond between the masonry and the reinforcement.
2. Lay units with full mortar coverage on horizontal and vertical joints in all courses.
3. Provide sufficient mortar on ends of masonry unit to fill head joints.
4. Rock closures into place with head joints thrown against two adjacent masonry units in place.
5. Do not pound corners or jambs to fit stretcher units after setting in place.
6. Where adjustment to corners or jambs must be made after mortar has started to set, remove mortar and replace with fresh mortar.

G. Mortar Joints and Patterns:
1. Lay CMU in running one-half (1/2) bond pattern, unless noted otherwise.
2. Lay brick in running one-third (1/3) bond pattern, unless noted otherwise on drawings. Refer to drawings for accent coursing.
3. Provide flush joints where concealed from view and where dampproofing is scheduled.
4. Provide standard concave tooled joint where masonry is exposed to view for brick and CMU, typically.
5. All mortar joints to be of consistent size.
6. Provide soldier courses where indicated, refer to the elevations.
7. All horizontal joints shall be concave tooled joint at face of units, unless noted otherwise.
8. Provide raked joints at all exposed burnished cmu locations.

H. Reinforcement, Anchor and Tie Systems:
1. General:
    a. Completely embedded in mortar or grout.
    b. All reinforcement consisting of bars or wire 1/4 inch or less in diameter embedded in the horizontal mortar joints shall have no less than 5/8 inch mortar coverage from the exposed face.

c. Where modular brick is used with brick coursing at 16 inches on center, provide ladder reinforcing within each wythe at 16 inches o.c. vertically for exterior wythe and back-up wythe, whether detailed or not. For other than modular brick, refer to Paragraph h. below.

d. Veneer anchors at exterior sheathed covered metal stud exterior walls shall be attached on outside face of sheathing using cadmium plated sheet metal screws. Spacing shall be same as stud spacing o.c. horizontally and 16 inches o.c. vertically.

e. Veneer anchors at Interior brick walls with metal stud back-up shall be the same as Paragraph “d” above, except anchors shall be attached directly to metal stud with recommended corrosion resistant fasteners in accordance with manufacturer’s recommendations.

f. At intersection of all perpendicular masonry walls provide two (2) vertical rows of ladder type reinforcing at 16 inches o.c. vertically.

g. Weld veneer anchors to structural steel in accordance with manufacturer’s recommendations. Touch-up steel shop paint and galvanized coating on anchor with touch-up primer and finish coats to match damaged coating in accordance with manufacturer’s recommendations.

h. In cavity walls with CMU back-up, embed truss type horizontal reinforcement with integral adjustable pintle wall ties every 16 inches o.c. vertically.

i. Splices in reinforcement: Splices may be made only at such points and in such manner that the structural strength of the member will not be reduced. Lapped splices shall be eight (8) inches. Welded or mechanical connection shall develop the strength of the reinforcement.

j. Corrugated strap ties shall not be used as veneer anchors at exterior or where subject to moisture. Their use in interior, dry conditions are acceptable.

k. Place joint reinforcement in the first two (2) bed joints above and the first two (2) bed joints below masonry openings. Extend extra reinforcing two (2) feet beyond jambs.

l. Provide masonry ties at floor and roof decks as indicated.

I. Flashing:

1. Follow manufacturer’s instructions for mechanically fastened installation with a termination bar.

2. Application Guidelines - Install flashing at the following locations:

a. Membrane Flashing: material transitions inside exterior cavity walls, roof edge/exterior wall transitions, masonry joints (control/expansion) inside exterior cavity walls, exterior door and window frame perimeters, roof deck/exterior wall transitions, exterior wall penetrations (i.e. pipe, conduit, ducts, etc.). Provide membrane at all joints, holes, gaps, or openings to ensure a continuously sealed building envelope. Utilize primer on substrates as instructed by manufacturer.

b. Copper Flashing: At all horizontal wall flashing, including (but not limited to) exterior wall sill/weep conditions, exterior door and window head/weep conditions, masonry wall cap flashing and masonry wall base flashing.

3. Apply substrate primer as instructed by membrane manufacturer to suit condition.

4. Provide drip edge flashing at weep conditions with membrane flashing. Cut membrane flush with outside edge of brick over top of drip edge flashing to alleviate exposure to UV degradation and deterioration of asphalt membrane.

5. On Horizontal Surfaces: The flashing shall be laid in a slurry of fresh mortar and topped with a fresh full bed of mortar. The flashing shall be cut flush with the exterior face of the wall after being left exposed for inspection purposes only. Flashing shall be carried through the wall, turned up where possible to facilitate drainage through the weepholes, then carried upward across the cavity a minimum of six (6) inches. Flashing will then be secured in back wall with termination bar.

6. On Vertical Surfaces: Surfaces receiving the flashing shall be sufficiently spotted with asphalt mastic to hold in place until masonry is set. Secure in back wall with termination bar.
7. Foundation Sill Dampproofing: The flashing for foundation sills shall be laid in a slurry of fresh mortar and topped with a fresh full bed of mortar. The flashing shall be cut flush with the exterior face of the wall after being left exposed for inspection purposes only. Flashing shall be sloped across the cavity and turned up the wall a minimum of ten (10) inches and secured to back wall with termination bar. Where sill and column meet, flashing shall be brought up a minimum of ten (10) inches up the column.
8. Thru-Wall Flashing: Shall be cut flush with the exterior face of the wall after being left exposed for inspection purposes only. Carry flashing through the wall, turned up where possible to facilitate drainage through the weepholes, then carried upward across the cavity a minimum of six (6) inches, unless noted otherwise, and secure in back wall with termination bar.
9. Cavity Wall: Flashing shall be laid in a slurry of fresh mortar and topped with a fresh full bed of mortar. Flashing shall be cut flush with the exterior face of the wall after being left exposed for inspection purposes only. Flashing shall be carried through the wall and upward across the cavity a minimum of six (6) inches, unless noted otherwise, and secured in the back wall with termination bar. Vertical membrane joints shall be secured with termination bar as instructed by membrane manufacturer.
10. Heads and Sills: Flashing for heads and sills shall be cut flush with the exterior face of the wall after being left exposed for inspection purposes only. Flashing shall be carried through the wall and upward across the cavity a minimum of six (6) inches, unless noted otherwise. Head flashing shall be carried six (6) inches beyond both end of the steel lintel. Both head and sill flashing shall be turned up at the sides to form a pan. All corners shall be folded, NOT CUT. Install weepholes.
11. Spandrels: Spandrel flashing shall start from the outside toe of the shelf angle, go up the face of the beam and then through the wall, turned up on the inside not less than two (2) inches. Install weepholes.
12. Parapet or Coping: Flashing for parapets or coping sills shall be laid in a slurry of fresh mortar and topped with a fresh full bed of mortar. Flashing shall be cut flush with the exterior face of the wall after being left exposed for inspection purposes only. Weepholes shall be installed immediately on top of the flashing.
13. Lengths: Install flashings without longitudinal joints within walls, if possible. If required materials are not available in a single width, join by lapping material minimum two (2) inches and seal joint throughout its length with adhesive.
14. End Joints: Avoid end joints in flashing. When end joints are necessary, lap flashing minimum six (6) inches and seal joint continuously with adhesive.
15. Penetrations: Where anchors, pipes, and inserts penetrate flashing, make opening in flashing snug and seal with adhesive.
16. Reglet Termination: Insert wedge into place and seal carefully with adhesive
17. Termination Bar: Install flashing with termination bars in accordance with manufacturer's instructions. Provide 3 coursing at all termination bars, typical.
18. Top Coat: After flashing material is in place (except in masonry joints where bond and mortar is required) trowel full 1/8 inch protective coating or mastic on all flashing faces.

J. Laying Masonry: Lay units plumb, level, and true to line with full head and bed joints. Butter ends of masonry with sufficient mortar to fill head joints. Do not furrow bed joints. Slope top of bed joint toward center of wall to minimize amount of mortar forced into grout space. Remove mortar, protruding from joints into grout space, before pouring grout.

K. Reinforcing Bars:
1. Hold vertical bars in position at top and bottom and at intervals not exceeding eight 8 feet-0 inches with a minimum clearance of 1/4 inch from masonry and not less than one (1) bar diameter between bars.

2. When a foundation dowel is not in alignment with a vertical block cell or pilaster, slope it not more than one (1) horizontal in six (6) vertical to bring it into proper alignment before grouting.
3. Place horizontal reinforcing bars in continuous masonry courses, consisting of bond-beam or trough block units, and solidly grout in place.
4. Use straight reinforcing bars except for bends around corners and where bends or hooks are detailed on plans.
5. Lap reinforcing steel 40 bar diameters minimum where spliced and wire together.

L. Grouting: Where detailed place grout in reinforced masonry beams, walls, columns, and pilasters. All cells and spaces containing reinforcing bars shall be filled with grout. Wherever possible grouting shall be done from inside face of masonry. Exercise extreme care to prevent grout from staining face of masonry. Immediately remove any spilled grout from face and top of masonry.
1. Prior to grouting clean space so that all spaces to be filled with grout do not contain mortar projections greater than 1/2 inch, mortar droppings or other foreign material. Grout shall be placed so all spaces designated to be grouted shall be filled with grout and grout shall be confined to those specific spaces.
2. Grout materials and water content shall be controlled to provide adequate fluidity for placement, without segregation of constituents and shall be mixed thoroughly.
3. Between grout pours a horizontal construction joint shall be formed by stopping all wythes at the same elevation and with grout stopping a minimum of 1-1/2 inches below a mortar joint, except at top of wall. Where bond beams occur, stop grout pour a minimum of 1/2 inch below top of masonry.
4. Reinforcement shall be placed prior to grouting. Bolts shall be accurately set with templates or by approved equivalent means and held in place to prevent movement.
5. Segregation of grout materials and damage to masonry shall be avoided during the grouting process. Adequately brace masonry to prevent displacement or cracking during grouting operations.
6. Grout shall be consolidated by mechanical vibrator during placing, before loss of plasticity, in a manner to fill grout space. Grout pours greater than 12 inches shall be reconsolidated by mechanical vibration to minimize voids due to water loss. Grout pours 12 inches or less in height shall be mechanically vibrated, or puddled.
7. Grout shall not be handled nor pumped utilizing aluminum equipment.
8. Size and height limitations of grout space or cell shall be as follows:

GROUT TYPE	GROUT POUR MAX. HEIGHT (FEET)	LEAST CLEAR DIMENSIONS		CLEANOUTS REQUIRED
		Width of Grout Space (In.)	CMU Cell Dim. Dims. (In. x In.)	
Fine	1	3/4	1-1/2 x 2	No
Fine	5	1-1/2	1-1/2 x 2	No
Fine	8	1-1/2	1-1/2 x 3	Yes
Coarse	1	1-1/2	1-1/2 x 3	No
Coarse	5	2	2-1/2 x 3	No
Coarse	8	2	3 x 3	Yes

a. Clear dimension is the cell or grout space width less mortar projections.
b. Grout space width shall be increased by the horizontal projection of the diameters of horizontal bars within the cross section of the grout space.

9. Place grout in lifts not exceeding 8 feet-0 inches.

M. Concreting: Supervise placing of concrete in cores of masonry beams and lintels and over masonry soffits where structural concrete is detailed. Report discrepancies or procedures which may adversely affect performance of masonry Work.

N. Brick Weep holes:
1. Provide weep holes above all thru-wall flashings where weep holes occur at the base of the wall. The mason shall coordinate the location of the thru-wall flashings with the location of the sidewalks on the civil engineering drawings. All weep holes shall be at least one course below finished floor or at the first course of brick above the sidewalks. Pay particular attention to areas near exterior doors.
2. Ensure cavity drainage protection is properly installed.
3. Leave head joint free and clean of mortar.
4. Spacing: 20 inches on center maximum for king sized brick, and 24 inches on center for modular brick and block, unless shown otherwise.
5. Keep weep holes and area above flashing free of mortar droppings.
6. Coordinate weep holes to be located above sidewalks and paving.

O. Sealant Joints:
1. Allow for sealant joints around outside perimeters of exterior doors, window frames and other wall openings.
2. Uniform depth: 3/4 inch.
3. Uniform width: As shown on the drawings but not less than 1/4 inch.
4. Provide sample for Architect's approval.
5. Refers to drawing for locations and details of accent joints.

P. Movement Joints (Expansion Joints and Control Joints):
1. Locate expansion and control joints as shown on drawings, or if not shown, comply with the following:
    a. General:
        1) Vertical expansion joints shall be placed in the brick wythe and control joints shall be placed in the concrete masonry wythe, although they do not necessarily have to be aligned.
        2) Mortar and joint reinforcement shall not bridge brick movement joints.
        3) Mortar joints which stop at the expansion joint cavity shall be struck flush with the masonry unit, producing a continuous flat surface for the sealant to adhere to.

    b. Vertical Expansion Joints:
        1) Locate expansion joints on long straight walls without openings maximum 25 feet-0 inches.
        2) Locate expansion joints at the corner of walls perpendicular to one another. In instances, where the joint is not desired at the corner, the expansion joint shall be located within 10 feet-0 inches of the corner in either wall, but not necessarily both. The spacing of expansion joints around a corner shall not exceed the spacing of expansion joints in a straight wall. For example, if the spacing between expansion joints on a straight wall is 25 feet-0 inches, then the spacing of expansion joints around a corner could be 10 feet-0 inches on one side of the corner and 15 feet-0 inches on the other side. Joint reinforcement may be added around wall corners to provide added tensile strength to the corner, but joint reinforcement shall not bridge the expansion joint.

    c. Offsets and Setbacks:

1) Locate expansion joints at 10 feet-0 inches maximum on one side of the offset or setback. The spacing of expansion joints around an offset or setback shall not exceed the spacing of expansion joints in a straight wall. See expansion joints at corners of perpendicular walls to one another above for example of spacing.

d. Openings (Doors and Windows):
   1) Locate vertical expansion joints along the edge or jamb of the opening of windows and doors. Single opening windows and doors under 6 feet-0 inches in width shall have expansion joint on one (1) side of the edge or jamb of the opening as determined by the Architect, unless shown otherwise on drawings. Windows and doors 6 feet-0 inches and over in width shall have expansion joints on both sides of the edge or jamb of the opening.
   2) Where masonry above an opening is supported by shelf angles attached to the structure, a vertical expansion joint shall be located alongside the opening, continuing through the horizontal support.
   3) Where masonry above the opening is supported by loose lintels (unattached to the structure), special detailing and construction is required. If the expansion joint runs along side the opening, the loose steel lintel shall be allowed to expand independently of the masonry. To accomplish this, form a slip plane with flashing located above and below the angle. A backer rod and sealant shall be installed in front of the toe of the angle, and space shall be left at the end of the angle. Thus, a pocket will be formed which will allow movement of the steel angle within the brickwork. If the joint cannot be built in this manner, then the vertical expansion joint shall not be located alongside the opening, but rather, with Architect's prior approval, the joint shall be located halfway between the openings.

e. Intersections and Junctions:
   1) Locate expansion joints at intersections of masonry walls and walls which serve different functions. If the masonry is not required to be bonded at the intersection, an expansion joint shall be incorporated. Walls which intersect at other than right angles are also vulnerable to cracking at the intersection.
   2) Locate expansion joint to separate adjacent walls of different heights to avoid differential movement, especially if the difference is very large.

f. Parapets:
   1) All vertical expansion joints shall be carried through the parapets.
   2) Additional expansion joints shall be halfway between those running full height, unless the parapet is reinforced. These additional expansion joints shall continue down to a horizontal expansion joint, or continue to the base of the wall.

g. Horizontal Expansion Joints:
   1) Locate horizontal expansion joints at shelf angles supporting brick masonry.

h. Control Joints:
   1) Locate CMU control joints directly over concrete slab control joints.
   2) Whenever possible, lay out CMU so that control joint will coincide with CMU module (25 feet-0 inch maximum spacing between control joints), unless noted otherwise on drawings.
   3) Locate control joints at structural columns to isolate movement from continuing or intersecting walls and columns.

4) Install backer rod and sealant in accordance with manufacturer's instructions.

3.4 ALLOWABLE TOLERANCES

A. Maximum Variation from Plumb:
   1. In lines and surfaces of columns, walls and at rises:
      a. 1/4 inch in 10 feet
      b. 3/8 inch in 20 feet (maximum).
      c. 1/2 inch in 40 feet

   2. For external corners, expansion joints and other conspicuous lines:
      a. 1/4 inch in 20 feet (maximum).
      b. 1/2 inch in 40 feet

B. Maximum variation from level:
   1. 1/4 inch in any bay or 20 feet.
   2. 1/2 inch in 40 feet

3.5 REMOVAL OF FORMS AND SHORES

A. Do not remove shores and forms under reinforced masonry beams, lintels, and soffits until members have hardened sufficiently to carry their own weight and other super imposed loads. Providing that sufficient curing has taken place, leave forms and shores in place as follows:
   1. Beam and lintels: Minimum ten (10) days.

B. Allow 16 hours to elapse after completion of masonry columns and walls before placing floor or roof construction loads on them. Allow an additional 48 hours before applying concentrated loads such as trusses, girders, and beams.

3.6 REPAIRING, POINTING AND CLEANING

A. All holes in exposed masonry shall be pointed, and defective joints shall be cut out and re-pointed with mortar.

B. Before applying any cleaning agent to the entire wall, it shall be applied to a sample wall area of approximately 20 square feet, in a location approved by Architect. No further cleaning Work may proceed until the sample area has been approved by Architect, after which, the same cleaning materials and method shall be used on remaining wall area. Sash, metal lintels and other corrodible parts shall be thoroughly protected.
   Clean all exposed surfaces of new masonry of excess mortar, efflorescence, stains, and job dirt, using materials specified.
   1. Clean from bottom up; prevent cleaning materials and rinse water from contacting non-cementitious materials.
   2. Clean in accordance with manufacturer's instructions and recommendations, product data, and container label instructions.
   3. Mix materials in strict accordance with manufacturers instructions; do not dilute unless permitted by manufacturer.
   4. Prevent overspray, wind drift, and splash onto surfaces not to be treated.
   5. No high pressure washers are permitted.
   6. Low pressure spray for wetting and rinsing is permitted. Pressure should be in the range of 400-1000 psi. Equipment should produce 6-8 gallons of water per minute using a 15-40 degree fan tip (no fan tip less than a 15 degree is allowed).
   7. No metal tools or wire brushes are allowed for cleaning of masonry. Use a waste piece of same masonry material for scraping of installed material.

3.7 REPAIR OR REPLACEMENT OF DAMAGED WORK

A. Imperfect or damaged Work, or any material damaged or determined to be defective before final completion and acceptance of the entire job, shall be satisfactorily replaced at Contractor's expense and in conformity with all requirements of drawings and specifications. Removal and replacement of masonry Work shall be performed in such a manner as not to impair the appearance or strength of the structure in any way.

3.8 CLEAN-UP AND PROTECTION

A. Clean up all debris caused by Work of this Section, keeping the area clean and neat at all times.

B. Cover all unfinished Work at night against the elements with plastic sheeting, building paper, heavy canvas or other material approved by Architect to prevent water from entering cavities.

C. Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure unit masonry is without damage and deterioration at time of Substantial Completion.

3.9 FIELD QUALITY CONTROL AND TESTING

A. Inspection and Testing Laboratory services shall be in accordance with Section 01 45 23, Testing and Inspecting Services.

END OF SECTION 04 20 00

SECTION 04 21 13.23 - SURFACE-BONDED BRICK MASONRY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Thin Brick.
   2. Mortar.
   3. Adhesives.
   4. Accessories.

1.3 REFERENCE STANDARDS

A. ASTM C841 - Standard Specification for Installation of Interior Lathing and Furring; 2023.

B. ASTM C1088 - Standard Specification for Thin Veneer Brick Units Made from Clay or Shale; 2023.

C. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2024.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

1.5 SUBMITTALS

A. See Section 01 30 00 - Project Management and Coordination for submittal procedures.

B. Product Data: Provide data for thin brick units, mortar, grout, and adhesive.

C. Samples: Submit four samples of thin brick units to illustrate color, texture, and extremes of color range.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.

B. Installer Qualifications: Company specializing in performing work of type specified and with at least five years of documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

B. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

1.8 FIELD CONDITIONS

A. Do not install adhesives in an unventilated environment.

PART 2 PRODUCTS

2.1 GENERAL

A. Manufacturers:
   1. Manufacturers listed whose products meet or exceed the specifications are approved for use in the Work. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.

B. Substitutions: Refer to Section - 01 25 00 - Substitution Procedures.

2.2 THIN BRICK

A. Manufacturers:
   1. Endicott Clay Products Co: www.endicott.com/#sle.
   2. General Shale Brick: www.generalshale.com/#sle.
   3. Meridian Brick LLC; Athens Architectural Series: www.meridianbrick.com/#sle.
   4. Metro Brick: www.metrothinbrick.com/#sle.
   5. Old Mill Brick, Inc: www.oldmillbrick.com/#sle.

B. Thin Brick: ASTM C1088.
   1. Type: TBX.
   2. Size: Manufacturer's standard Modular.
   3. Thickness: 5/8 inch..
   4. Tolerances: 1/16 inch..
   5. Color, Texture, Range, Special Shapes: As selected by Architect from manufacturer's standard range of colors, textures and blends.
   6. Protective Coating: Wax.

2.3 ADHESIVE MATERIALS

A. Manufacturers:
   1. Bostik Inc: www.bostik-us.com/#sle.
   2. LATICRETE International, Inc; LATICRETE MVIS Hi-Bond Mortar: www.laticrete.com/#sle.
   3. Mapei Corporation: www.mapei.com/#sle.
   4. Parex USA Inc; Thin Veneer Adhesive: www.parexusa.com/#sle.

2.4 MORTAR MATERIALS

A. Mortar and Grout: Refer to Section 04 05 00 - Common Work Results for Masonry.

2.5 ACCESSORIES

A. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

PART 3- EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive thin brick veneer.

B. Verify that related items provided under other sections are properly sized and located.

C. Verify that built-in items are in proper location, and ready for installation of thin brick veneer.

3.2 INSTALLATION

A. Interior Applications: Comply with TCNA (HB) Method W211, W221, W222, W223, W231, W241, W242, W243, W244C, W244F, W245, W246, or W247.

B. Exterior Applications: Comply with TCNA (HB) Method W201, W202, or W244E.

C. Install interior lath and furring in accordance with ASTM C841.

D. Install lath and furring for Portland cement plaster in accordance with ASTM C1063.

3.3 CONTROL AND EXPANSION JOINTS

A. Form joints as detailed on drawings.

3.4 CLEANING

A. Clean soiled surfaces with cleaning solution.

3.5 PROTECTION

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION 04 21 13.23

SECTION 05 12 00 - STRUCTURAL STEEL

PART 1 – GENERAL

1.1 REFERENCED DOCUMENTS

A. The drawings and General Provisions of the Contract, including the General and Supplementary Conditions and Division Specification Sections, apply to work specified in this Section.

1.2 DESCRIPTION OF WORK

A. Work Included: Furnish all labor, and materials, services, equipment and appliances required in conjunction with or properly incidental to furnishing, fabrication, delivery, and erection of structural steel complete, including, but not limited to, the following:
   1. Structural steel columns, girders, beams, angles, rigid frames, trusses, shelf angles, angle frames for opening in floors and roofs, galvanized cooling tower grillage, steel supports for elevator machines, steel hoist beams for elevator equipment, steel supports for elevator guide rails, steel plates, miscellaneous deck support angles, shop welded shear studs, connections and component parts.
   2. Qualification of welders.
   3. Shop prime coat of paint and field touch-up painting.
   4. Grouting of base plates.
   5. Temporary construction bracing.
   6. Fabrication/erection inspection and testing.

B. Extent of structural steel work is shown on Drawings including schedules, notes and details to show sizes and locations of members, typical connections and types of steel required.

C. Include all supplementary parts and members necessary to complete structural work, regardless of whether all such parts are definitely shown or specified and furnish all such bolts, gussets, plates, etc., as may be required for proper assembly of all items. Include miscellaneous deck support angles as required for proper support of metal floor deck around columns, gussets, openings, and obstructions.

D. Connection Design:
   1. All typical beam to column and beam to beam connections are detailed and shown on the Construction Documents. The Contractor is to comply with these details.
   2. Where indicated, truss, bracing connections and special or non-typical structural steel beam connections shall be designed by the fabricator, in accordance with criteria on Drawings. Fabricator-designed connections shall be submitted together with complete calculations for review for acceptability by the Architect.

E. Substitutions:
   1. Proposed substitutions of sections or modification of details, and reasons, therefore, shall be submitted with shop drawings for review. Submitted substitutions must be clearly identified and noted as such. Approved substitutions, modifications, and necessary changes in related portions of work shall be coordinated by the fabricator and shall be accomplished at no additional cost to Owner.
   2. Substitutions to the beam to column and beam to beam connections shown on the drawings will be reviewed for acceptability if submitted with calculations prepared by a licensed professional engineer.

F. Responsibility for Errors: Fabricator shall be responsible for all errors of detailing, fabrications, and for correct fitting of structural steel members.

G. Templates: Shall be furnished by fabricator with instructions for setting of anchor bolts and bearing plates.

H. Related Work Specified in Other Sections:
   1. Testing laboratory services for verification of quality
   2. Miscellaneous metal fabrications.
   3. Metal stairs.
   4. Finished painting.
   5. Grouting of base plates

1.3 QUALITY CONTROL

A. The latest adopted edition of all standards referenced in this Section shall apply, unless noted otherwise. In case of conflict between Contract Documents and a referenced standard, Contract Documents shall govern. In case of conflict between Contract Documents and Building Code, more stringent shall govern.

B. Contractor shall furnish fabrication/erection inspection and testing of all welds in accordance with AWS D.1.1, Chapter 6. Submit records of inspections and tests to Owner’s testing laboratory for their review.

C. The Fabricator shall have developed a detailed fabrication procedural manual reflecting key quality control procedures used in fabrication process and shall provide a copy of the manual for examination by Owner’s testing laboratory.

D. The fabricator shall employ a competent technician, engineer or independent testing laboratory to inspect fabrication work to ensure compliance with Contact Documents and shall identify such inspector to Owner’s testing laboratory. Inspector shall examine in the shop all welding, bolting, shear studs, painting, galvanizing, and straightness and alignment of fabricated members.

E. Testing Laboratory Services for Verification of Quality

F. All materials, fabrication procedures, and field erection are subject to verification inspection and testing by Owner’s testing laboratory, in both shop and field. Such

inspections and tests will not relieve Contractor of his responsibility for providing materials and fabrication procedures in compliance with specified requirements.

The owner reserves the right to use ultrasonic or radiographic inspection to verify adequacy of all welds. Testing procedures and acceptance criteria shall be as specified in AWS D1.1. Promptly remove and replace materials or fabricated components which do not comply.

G. Qualifications for Welding Work: Contractor shall be responsible for qualifying welding operators in accordance with AWS “Standard Qualification Procedure”. Provide certification, to Owner’s testing laboratory, that welders to be employed in work have satisfactorily passed AWS qualification tests within previous 12 months. If recertification of welders is required, retesting will be the Contractor’s responsibility.

H. Qualifications of Welding Procedures: Contractor shall provide testing laboratory with welding procedures which are to be used in executing this work. Welding procedures shall be qualified prior to use in accordance with AWS D1.1, Part B.

I. Comply with Provisions of the Following Codes, Specifications and Standards, in Addition to Building Code:
   1. AISC, “Code of Standard Practice for Steel Buildings and Bridges”.
   2. AISC, “Specification for Structural Steel Buildings”, including “Commentary” and Supplements thereto, as issued.
   3. AISC, “Specifications for Structural Joints using ASTM A 325 or A 490 Bolts”, Approved by the Research Council of Structural Connections for the Engineering Foundation.
   4. AISC, “Specification for Architecturally Exposed Structural Steel”.
   5. AWS D1.1, “Structural Welding Code”.
   6. ASTM A6, “Specifications for General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use”.
   7. Industrial Fasteners Institutes, “Handbook on Bolt, Nut, and Rivet Standards”.
   8. Steel structure painting council:
      a. Painting manual, Vol. 1, Good Painting Practice.
      b. Painting manual, Vol. 2, Systems Specifications.

J. Qualifications:
   1. Structural steel fabricators shall have not less than 10 years’ experience in fabrication of structural steel for buildings.
   2. Structural steel erector shall have not less than 5 years’ experience in erection of structural steel.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer’s specifications and installation instructions, including laboratory test reports and other data, to show compliance with Specifications for the following products.
   1. Structural steel primer paint.
   2. Shrinkage-resistant grout.
   3. Shear studs.

B. Mill Certificates: Submit for Architect's record certificates of mill analysis showing compliance with Specifications for the following products:
   1. Structural steel (each type).
   2. High-strength bolts (each type), including nuts and washers.
   3. Shear studs.

C. Shop Drawings:
   1. All typical beam to column and beam to beam connections are detailed and shown on the Contract Documents. The Contractor is to comply with these connection details. If the Contractor would like to substitute a connection, it shall be submitted in accordance with the specified procedure for substitutions, with calculations prepared by a licensed professional engineer.
   2. Submit shop drawing of all structural steel, including complete details and schedules for fabrication and shop assembly of members, erection plans and details, procedures, and diagrams showing sequence of erection. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols and show size, length, and type of each weld.
   3. Submit design calculations for the non-typical beam, truss and bracing connections that are designed by the fabrication. Calculations shall bear seal of a Licensed Professional Engineer, licensed in the State of Texas. Calculations shall show applied loads and reference applicable piece mark from the shop drawings as well as location or mark from structural drawings.
   4. Structural steel members for which shop drawings have not been reviewed shall not be fabricated. The architect's review shall cover general locations, spacings and details of design. Omission from show drawings of any materials required by Contract Documents shall not relieve Contractor of responsibility of furnishing and installing such materials, even though such shop drawings may have been reviewed and returned.
   5. Submit setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed by other trades.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not delay that work.

B. Store materials to permit easy access for inspection and identification. Keep steel members off ground using pallets, platforms or other supports. Protected steel members and packaged materials from corrosion and deterioration.

C. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

D. Support cambered members during shipment and handling in a manner which will not result in loss of camber.

1.6 JOB CONDITIONS

A. Coordinate erection of structural steel with work of other trades.

B. Do not install columns which have embeds or anchor bolts in concrete until concrete members have attained their 28 day compressive strengths.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Metal Surfaces, General: For fabrication of work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names, and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating and application of surface finishes.

B. Steel:
1. Wide flange (W) shapes, tees, splice plates and stiffener plates: ASTM A 992 (50 ksi yield).
2. Other rolled shapes, plates, and bars: ASTM A 36 (36 ksi yield).
3. Cold formed steel tubing (HHS): ASTM A 500, Grade B, (46,000 psi yield).
4. Steel pipe: ASTM A 53, Type E or S, Grade B.
5. All structural shapes within groups 4 and 5 of A.I.S.C. grouping for tensile property classification shall be supplied using killed steel.
6. For ASTM A 6 (Groups 4 and 5) rolled shapes (spliced or otherwise) connected by full penetration welds provide material with Charpy V-Notch testing, in accordance with ASTM A 6, Supplementary Requirement S5. The impact test shall meet a minimum average value of 20 foot-pounds absorbed energy at 70° F and shall be conducted in accordance with ASTM A 673 and AISC Specifications for Structural Steel Buildings.
7. For plates exceeding 2" thickness used in built-up members, which are spliced or connected by full penetration welds, provide material with Charpy V-Notch, testing in accordance with ASTM A 6, Supplementary Requirement S5. Impact test shall be conducted by producer in accordance with ASTM A 673, Frequency P and shall meet a minimum average value of 20 foot-pounds absorbed energy at 70° F.

C. Bolts and Washers:
1. Anchor bolts: Anchor bolts (or anchor rods) for anchoring to concrete shall conform to ASTM F1554, Grade 36, and to requirements for regular hexagon bolts and nuts of ANSI Standards B 18.2.1 and B18.2.2. Washers for anchor bolts shall be oversize.
2. All bolts for connections shall be high strength bolts conforming to ASTM A 325. Dimensions of bolt heads and nuts shall conform to requirements for heavy hexagon nuts of ANSI Standards B18.2.1 and B18.2.2. Nuts shall be ASTM A 563 materials.
3. Washers: Flat and smooth circular hardened washers conforming to requirements of ASTM F 436. Beveled washers for S shapes and channels shall be square or rectangular, taper in thickness, and smooth. Washers for use with high-strength bolts shall be hardened.
4. Direct tension indicator washers for high-strength bolts in friction connections shall conform to ASTM F 959, Type A 325.

5. Tension control (twist off) bolts may, at Contractor's option, be used in lieu of conventional high-strength bolts. Tension control bolts shall conform to ASTM F 1852 with A 325 marking.
6. Drilled expansion anchor bolts shall be one of the following (no substitutions):
   Wej-it Bolt, Wej-it Corporation, Tulsa, OK
   Kwik Bolt, Hilti Fastening Systems, Tulsa, OK.
   Trubolt, Ramset Fastening Systems, Paris, KY.

D. Welding electrodes shall conform to requirements of Specifications of American Welding Society. Use E70 electrodes. For high-strength, low-alloy steel, provide electrodes, welding rods, and filler metals equal in strength and compatible in appearance with parent metal jointed.

E. Shear studs shall be shear connectors with proper ferrules and accessories, especially designed to create composite deck action between concrete deck and supporting beam. Steel for studs shall conform to requirements of Specifications for Steel Bars, Carbon, Cold Finished Standard Quality, ASTM A 108, Grades 1015-1020, with a minimum tensile strength of 60,000 psi. Studs shall be of uniform diameter, heads shall be concentric and normal to shaft and weld end shall be chamfered, welds shall be solid flux.

F. Primer Paint:
   1. Standard shop coat of red oxide primer, meeting requirements of "SSPC-Paint 13" or Federal Specification "TT-P-636", applied to a dry film thickness of 2.0 mils, or
   2. Tnemec 10-99G (Green) Primer or Carboline "Rustamore 29" (Gray) Primer, applied to a dry film thickness of not less than 2.5 mils.
   3. Epoxy primer for exterior exposed steel (not noted to be galvanizied) - Tnemec "Series 66-1211 Hi-Build Epoxoline" Primer or Carboline "Carboline 885" applied to a dry film thickness of 3 to 5 mils.
   4. For architecturally exposed steel - primer as specified in Division 9 or, if not specified, as recommended by manufacturer of finish coat specified in Division 9.

G. Non-shrink Grout: Premixed, non-shrinking, non-metallic grout. Compressive strength in 28 days shall be 5000 psi minimum, but in no case less than specified strength of base concrete. Grout shall conform to ASTM C 1107, Grade B when tested at fluid consistency.

H. Zinc-coating: For galvanized steel shall conform to ASTM A 123, threaded products shall conform to ASTM A 153, Class C and sheet steel shall conform to ASTM A 591.

I. Use "ZRC" cold galvanizing compound, as manufactured by ZRC Chemical Products, Quincy, Mass.

J. Slide Bearings: If required, shall be reinforced teflon, factory prebonded to steel plates with initial static coefficient of friction not exceeding 0.06 at interface, over a working stress range of 500 to 2000 psi. Bearing shall be one of the following:
   1. "Fluorogold" slide bearings, by Fluorocarbon Co., Pine Brook, N.J.
   2. "Con-Slide" slide bearings, by Con-Serv, Inc., East Hampton, N.J.

2.2 FABRICATION

A. Shop Fabrication and Assembly:
   1. Fabricate and assemble structural assemblies in the shop to the greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings.
   2. Provide camber in members where indicated. Specified camber applies at jobsite, just prior to erection, lying down flat so that member weight has no effect. The contractor shall take necessary precautions to prevent or compensate for camber loss during shipment. Measured camber in members up to 50'-0" long shall be within a tolerance of -0" to +1/2" from amount specified. For members greater than 50'-0" long, both positive and negative tolerance may increase 1/8" for every 10'-0" of length in excess of 50'-0". Members with a field measured camber outside of specified tolerance shall be returned to shop.
   3. If heat is used to camber steel beams, it shall be carefully controlled and applied in a manner which will not alter the material properties of the member, and only in the presence of the testing laboratory. Follow AISC recommendations for heat cambering.
   4. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
   5. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of marking, burrs, and other defects.
   6. Splicing of structural steel members is prohibited without prior approval of Architect. Any member having a splice not shown and detailed on approved shop drawings shall be rejected.
   7. Members in compression joints which depend on contact bearing shall have bearing surfaces milled to a common plane. Members to be milled shall be completely assembled before milling.
   8. Plates shall be free of gross internal discontinuities such as ruptures and delaminations. Plates shall comply with ASTM A 578, Level 1.
   9. Mill tolerances: Comply with ASTM A 6.
   10. Fabrication tolerances: Comply with AISC Code of Standard Practice.

B. Connections:
   1. Weld or bolt shop connections, as indicated on Drawings.
   2. Bolt field connections, except where welded connections or other connections are indicated. Provide specified threaded fasteners for all principal bolted connections. Holes for bolted connections shall be drilled or punched at right angles to member. The slope of surfaces under bolt head and nut shall not exceed 1:20. Provide beveled washers where slopes exceed 1:20. Bolt holes shall have a diameter not greater than 1/16" larger than nominal bolt diameter. Do not flame cut holes or enlarge by burning. Provide washers over all slotted holes in an outer ply.
   3. High-strength bolted construction: Install in accordance with AISC, “Specifications for Structural Joints using ASTM A 325 or A 490 Bolts”, (RCRBSJ)
   4. Welded construction: Comply with AWS Structural Welding Code for procedures, appearance and quality of welds and methods used in correcting

welding work. Assemble and weld built-up sections by methods which produce true alignment of axes without warp. Welds not specified shall be continuous fillet welds designed to develop full strength of member. No combination of bolts and welds shall be used for stress transmission at the same face of any connections.

5. Heavy shapes (ASTM A6, groups 4 and 5, and built-up sections containing plates thicker than 2"): Comply with all special requirements for welding heavy shapes continued in the AISC Specification and in AWS Structural Welding Code.
6. Clean completed welds prior to inspection. Slag shall be removed from completed welds, and adjacent base metal shall be cleaned by brushing or other suitable means. Tightly adherent splatter remaining after cleaning is acceptable unless its removal is required for the purpose of nondestructive testing.
7. For high-strength, low-alloy steels follow welding procedures recommended by steel producer for exposed and concealed connections.
8. Base plates: Hole sizes for anchor bolts may be oversized to facilitate erection as follows:
   Bolts 3/4" to 7/8" diameter - 5/16" oversize
   Bolts 1" to 2" diameter - 1/2" oversize
   Use oversize or plate washers under nut at all oversized holes in base plates. Washers must be large enough to cover entire hole. Washer thickness shall be at least 1/8 of bolt diameter.

C. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Shop weld shear connectors, shaped as shown, to beams and girders in composite construction which does not support metal deck. Use automatic end welding of headed stud shear connectors in accordance with manufacturer's printed instructions Apply before galvanizing where galvanized members are called for.
   1. Installation of shear connectors: End weld in shop, in accordance with Article 31 of AWS Code and Specifications of shear stud manufacturer. After installation, each ceramic ferrule shall be removed prior to placement of concrete. Adequate welding power must be available for studs being welded.
   2. All areas to which studs are to be attached shall be cleaned of rust, oil, grease, and paint. When mill scale is sufficiently thick to cause difficulty in obtaining proper welds removed by grinding or sand blasting.

D. Steel Wall Framing: Select members which are true and straight for fabrication. Straighten as required to provide uniform, square, and true members in completed wall framing.

E. Holes for Other Work: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on final shop drawings. Provide threaded nuts welded to framing and other specialty items as indicated to receive other work. Cut, drill or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

F. Zinc-coating: Following Steel Shall be Galvanized:
   1. Cooling tower grillage and supports, including fasteners.
   2. Cooling tower screen support members and braces.

3. Masonry shelf angles.
4. Exposed railing.

G. Architecturally Exposed Structural Steel: Shall be straight and true. Select or straighten members to meet permissible variations of ASTM A6, subject to tolerances of AISC Code of Standard Practice, Section 10. Exposed surfaces shall be smooth, free of embedded scale, trademarks, roll imperfection marks and other irregularities. Fill any depressions with weld metal of the same composition as the parent metal. Grind welds and raised marks smooth and flush with adjacent surfaces. See 05125 for additional information.

2.3 SHOP PAINTING

A. General: Shop paint structural steel, except members or portions of members to receive a galvanized coating or members to be embedded in concrete or mortar. Paint embedded steel which is partially exposed on exposed portions and initial 2" of embedded areas only.
   1. Do not paint surfaces which are to be welded.
   2. Do not paint surfaces which are scheduled to receive sprayed-on fireproofing.
   3. Do not paint surfaces of exposed high-strength, low-alloy steel members (weathering steel).
   4. Do not paint top surface of beams which support composite metal floor deck.
   5. Apply 2 coats of paint to surfaces which are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

B. Surface Preparation: After inspection and before shipping, clean steel to be painted. Remove loose rust, mill scale, spatter, and slag or flux deposits. Clean in accordance with Steel Structure Painting Council (SSPC) as follows:
   1. SP-2, “Hand Tool Cleaning” or SP-3, “Power Tool Cleaning” (for members in enclosed, air conditioned spaces)
   2. SP-6, “Commercial Blast Cleaning”. (for members exposed to weather, in non conditioned spaces, in crawl spaces, all members exposed to view, including those designated as AESS)
   3. SP-10, Near-White Blast Cleaning. (for high-strength, low-alloy steel surfaces to avoid uneven oxidation.)

C. Painting: Immediately after surface preparation apply structural steel primer paint in accordance with manufacturer’s instructions, at a rate to provide a uniform dry film thickness as specified. Use painting methods which results in full coverage of joints, corners, edges and exposed surfaces.

PART 3 – EXECUTION

3.1 INSPECTION

A. Erector must examine areas and conditions under which structural steel work is to be installed, and notify Contractor of conditions detrimental to proper and timely completion work.

3.2 SURVEY

A. Employ a registered professional engineer or public surveyor, experienced in survey work, to establish permanent bench marks as shown and as necessary for accurate erection of structural steel. Check elevations of concrete and masonry bearing surfaces and locations of anchor bolts and similar devices before erection work proceeds, report discrepancies to Architect. Do not proceed with erection until corrections have been made, or until compensating adjustments to structural steel work have been agreed upon with Architect.

3.3 ERECTION

A. General: Comply with AISC Specifications and Code of Standard Practice, and as herein specified.

B. Temporary Shoring and Bracing:
   1. Provide adequate shoring and bracing to safely withstand all loads to which structure may be subjected during construction process including wind loads, dead loads, construction material, and equipment loads. Such bracing shall remain in place as long as required for safety.
   2. As erection progresses, make a sufficient number of permanent welded or bolted connections to withstand erection stresses and maintain stability.
   3. Design of temporary shoring and bracing shall be responsibility of Contractor.

C. Temporary Planking; Provide planking and working platforms, as necessary, to effectively complete work.

D. Anchor Bolts: Furnish anchor bolts and other connectors required for securing structural steel to foundations and other in-place work. Furnish templates and other devices as necessary for presetting bolts and other anchors in accurate locations. Refer to Division 3 of these Specifications for anchor bolt installation requirements in concrete, and Division 4 for masonry installation.

E. Setting Bases and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates.
   1. Set loose and attached base plates and bearing plates, for structural members, on wedges or other adjusting devices.
   2. Tighten anchor bolts after supported members are positioned and plumbed. Do not remove wedges or shims but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.

F. Slide Bearing Plates: Shall be permanently affixed to member and support, respectively, by welding or bolting as indicated. Member faces shall be aligned and leveled so as to maintain full and level contact between surfaces before completing installation. Use tapered shims where required for leveling.

G. Field Assembly:
   1. Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming a part of a complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

2. Level and plumb individual members of structure within tolerances defined by AISC Code for Standard Practice, unless closer tolerances are required for proper fitting of adjoining or enclosing materials, in which case the most stringent shall apply.
3. Set horizontal members with their natural camber (or specified camber) up.
4. Exposed-to-view faces of members designated as architecturally exposed structural steel shall be plumbed, leveled and aligned to a tolerance not to exceed the amount permitted for structural steel, unless adjoining materials dictate a tighter tolerance.
5. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for the difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.
6. Splice members only where indicated and accepted on the final shop drawing.
7. Where parts cannot be assembled or fitted properly, as a result of errors in fabrication or of deformation due to handling or transportation, such condition shall be immediately reported to Architect, along with proposed method of correction. Straightening of bends or warps shall be done by approved methods. Bent or damaged heat-treated parts will be rejected.
8. Fastening of splices in compression members shall be done after abutting surfaces have been brought completely into contact.

H. Erection Bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds and grind smooth at exposed surfaces. On non-exposed welded construction, erection bolts shall be tightened securely and left in place, or if removed, holes shall be filled with plug welds.

I. Bolted Connections:
1. High-strength bolts shall be installed in conformance with “Specifications for Structural Joints using ASTM A 325 or A 490 Bolts”.
2. A 307 bolts and high-strength (A 325 and A 490) bolts noted to be “snug-tight” shall be tightened using a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench, bringing plies into snug contact.
3. High-strength bolts which are not specifically designated to be “snug-tight” shall be tightened to provide at least the minimum tension shown in Table 4 of “Specification for Structural Joints using ASTM A 325 and A 490 Bolts”. Tightening shall be done by turn-of-the-nut method, with direct tension indicators, or by properly calibrated wrenches.
4. Bolted parts shall fit solidly together when assembled. All joint surfaces shall be free of burrs, dirt and other foreign material that would prevent solid seating of parts.
5. Bolts tightened by calibrated wrench or torque control shall have a hardened washer under the element (nut or bolt head) turned in tightening.
6. Hardened washers shall be placed over slotted holes in an outer ply. Hardened beveled washers shall be used where the outer face of bolted parts has a slope greater than 1:20 with respect to bolt axis.

J. Field Welding: Comply with As Structural Welding Code and AISC Specification for Structural Steel Buildings. Pay particular attention to surface preparation, preheating, sequence, and continuity of welds. Where heavy shapes are to be welded, comply with all special requirements of AISC Specification and AWS Structural Welding Code.

K. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

L. Do not enlarge unfair holes in members by burning or by use of drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.

M. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in structural framing. Cutting will be permitted only on secondary members which are not under stress, as acceptable to Architect. Finish gas-cut sections equal to a sheared appearance when permitted.

N. Touch-up Painting: Immediately after erection, touch-up areas of hot-dip galvanized members where galvanizing has been abraded during shipping and erection and where it has been removed or damaged due to welding. Apply specified cold galvanizing compound in accordance with manufacturer's instructions, to a minimum dry film thickness of 20 mils.

3.4 CLEANUP

A. Clean up all debris caused by the work of this Section, keeping the area clean and neat at all times.

END OF SECTION 05 12 00

SECTION 05 12 13 - ARCHITECTURALLY-EXPOSED STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Additional requirements for structural steel members designated as architecturally-exposed structural steel (AESS).

1.2 RELATED REQUIREMENTS

A. Section 05 12 00 - Structural Steel: General requirements for structural steel members, including AESS framing specified in this section.

B. Section 05 21 00 - Steel Joists Alignment and location of bridging where joists are visible.

C. Section 05 31 00 -Metal Floor Decking: Erection requirements relating to exposed steel decking and its connections.

D. Section 05 50 00 - Metal Fabrications: Loose steel bearing plates and miscellaneous steel framing.

E. Section 07 81 23 - Intumescent Fireproofing: Fireproof protection to framing and metal deck systems.

F. Section 09 90 00 - Painting and Coating: Finish coat requirements and coordination with primer and surface preparation specified in this section.

1.3 REFERENCE STANDARDS

A. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges; 2016.

B. AISC 360 - Specification for Structural Steel Buildings; 2022.

C. ASTM A6/A6M - Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling; 2023.

D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2023.

F. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2020.

G. ASTM A1085/A1085M - Standard Specification for Cold-Formed Welded Carbon Steel Hollow Structural Sections (HSS); 2015.

H. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2023.

I. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.

J. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.

K. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).

L. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).

M. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Schedule and conduct a preinstallation meeting at project site one week prior to start of work of this section; require attendance by all affected installers. Coordinate

requirements for shipping, special handling, storage, attachment of safety cables and temporary erection bracing, final coating, touch-up painting, mock-up coordination, Architect's observations, and other requirements for AESS.

1.5 SUBMITTALS

A. Refer to Section 01 33 00 - Submittal Procedures for submittal procedures.

B. Product data for each type of product specified. Submit paint systems in accordance with Section 09 90 00 - Painting and Coating.

C. Shop Drawings: Detailing for fabrication of AESS components.
   1. Provide erection documents clearly indicating which members are AESS members and the AESS category of each part.
   2. Include details that clearly identify AESS requirements found in this specification. Provide connections for AESS consistent with concepts shown on drawings.
   3. Indicate welds by AWS A2.4 symbols, distinguishing between shop and field welds, and show size, length and type of each weld. Identify grinding, finish and profile of welds as defined by the designated AESS category.
   4. Indicate orientation of hollow structural section (HSS) seams and mill marks (where applicable).
   5. Indicate type, size, finish and length of bolts, distinguishing between shop and field bolts. Identify high-strength bolted slip-critical, direct-tensioned shear/bearing connections. Indicate orientation of bolt heads.
   6. Indicate which surfaces or edges are exposed and what class of surface preparation is being used.
   7. Indicate special tolerances and erection requirements as noted on drawings or defined by the designated AESS category.
   8. Indicate vent or drainage holes for HSS members.

D. AESS 1, AESS 2, AESS 3, AESS 4, and AESS C Samples: Provide samples of specific AESS characteristics. Samples may be small size samples or components of conventional structural steel demonstrating specific AESS characteristics, including surface preparation, sharp edges ground smooth, continuous weld appearance, weld show through, and fabrication mark removal .

E. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

F. Qualification data for fabricator and erector to demonstrate their capabilities and experience. Include lists of completed projects names and address, names and addresses of architects and owners, photographs showing detail of installed AESS, and other information specified.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: In addition to those qualifications listed in Section 05 12 00 - Structural Steel Framing, engage an AISC Certified Fabricator, experienced in fabricating AESS similar to that indicated for this project with a record of successful in-service performance, as well as sufficient production capacity to fabricate AESS without delaying the work.

B. Erector Qualifications: In addition to those qualifications listed in Section 05 12 00 - Structural Steel Framing, engage an AISC Certified Erector, experienced in erecting AESS work similar in material, design, and extent to that indicated for this project and with a record of successful in-service performance.

C. Welder Qualifications: Welding processes and welding operators qualified within previous 12 months in accordance with AWS D1.1/D1.1M and dated no more than 12 months before start of scheduled welding work..

D. Comply with applicable provisions of AISC 303, Section 10 for the designated AESS category.

1.7 MOCK-UP

A. Provide mock-ups for AESS 3, AESS 4, and AESS C of nature and extent indicated in Contract Documents.

B. Refer to Section 01 40 00 - Quality Requirements for additional requirements.

C. Locate mock-ups where directed by Architect. Mock-ups to be full-size unless Architect approves smaller models. Alternatively, when a mock-up is not practical, the first piece of an element or connection can be used to determine acceptability.

D. Notify Architect one week in advance of dates and times when mock-ups will be available for review.

E. Demonstrate applicable AESS characteristics for specified category of AESS on elements and joints in mock-up.

F. Build mock-ups using member sizes and materials indicated for final work.

G. Mock-up to demonstrate weld quality, contouring of welds at aligned walls of members, specified surface preparation, and finish coating.

H. HSS members to extend at least 6 inches from joint in mock-up.

I. Obtain Architect's written approval of mock-ups before starting fabrication.

J. Retain and maintain mock-ups during construction in an undisturbed condition as a standard for judging completed work.

K. Approved mock-ups in an undisturbed condition at Date of Substantial Completion may become part of completed work.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Handle finished pieces in accordance with Section 10 of AISC 303, using nylon-type slings, or chains with softeners, or wire ropes with softeners such that they are not damaged.

B. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration. Use special care in handling to prevent twisting or warping of AESS members.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Comply with Section 05 12 00 - Structural Steel Framing, except as amended in this section for aesthetic purposes.

B. Comply with AISC 303, Section 10 for specific AESS category designated on drawings.

2.2 FABRICATION

A. Fabricate and assemble AESS in shop to greatest extent possible. Locate field joints in AESS assemblies at concealed locations or as approved by Architect. Detail AESS assemblies to minimize field handling and expedite erection.

B. Permissible tolerances for member depth, width, out of square, and camber and sweep to be as specified in ASTM A6/A6M, ASTM A500/A500M, and ASTM A1085/A1085M.

C. For curved structural members, whether composed of a single standard structural shape or built-up, the as-fabricated variation from theoretical curvature to be equal to or less than standard camber and sweep tolerances permitted for straight members in applicable ASTM standard.

D. Use special care in handling and shipping of AESS both before and after shop painting to minimize damage to any shop finish. Use nylon-type slings or softeners when using chains or wire rope slings.

E. Bolted Connections:

1. Make in accordance with Section 05 12 00 - Structural Steel Framin. Provide bolt type and finish as noted herein.

F. Welded Connections:
   1. Comply with AWS D1.1/D1.1M and Section 05 12 00 - Structural Steel Framing.
   2. Assemble and weld built-up sections by methods that will maintain alignment of members without warp exceeding tolerances of this section.

G. Surface Preparation:
   1. Remove blemishes or unsightly surfaces resulting from temporary braces or fixtures.
   2. Remove backing and run out tabs.

H. Fabricate AESS in accordance with categories defined in AISC 303, as follows:
   1. AESS 1: Basic elements.
   2. AESS 2: Feature elements viewed at a distance greater than 20 fleet (feature elements not in close view).
   3. AESS 3: Feature elements viewed at a distance less than 20 feet (feature elements in close view).
   4. AESS 4: Showcase elements with special surface and edge treatment beyond fabrication (showcase elements).

2.3 PAINT SYSTEM

A. Compatibility: All components/procedures of AESS paint system to comply with coating system specified in Section 09 90 00 - Painting and Coating. As a minimum, identify required surface preparation, primer, intermediate coat (if applicable), and finish coat. Primer, intermediate coating, and finish coating to be from a single manufacturer combined in a system documented by manufacturer with adequate guidance for fabricator to procure and execute.

B. Primer: Organic, epoxy/zinc rich meeting class B surface requirements for slip critical connections, as found in AISC 360. Primer to comply with all federal standards for VOC, lead and chromate levels.

C. Finish Coating: Field apply intermediate and top coats per Section 09 90 00 - Painting and Coating.

2.4 SHOP PRIMING

A. Surface Preparation:
   1. Provide surface preparations to meet SSPC-SP 6.
   2. Coordinate required surface profile with approved paint submittal prior to beginning surface preparation.
   3. Prior to blasting, remove any grease and oil using solvent cleaning to meet SSPC-SP 1.
   4. Remove weld spatter, slivers and similar surface discontinuities.
   5. Ease sharp corners resulting from shearing, flame cutting or grinding.

B. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete, or high strength bolted with slip-critical connections.
   1. Extend priming of members partially embedded in concrete or mortar to a depth of 2 inches.

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's instructions to provide a dry film thickness of not less than 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
   1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
   2. Apply two coats of shop primer to surfaces that are inaccessible after assembly or erection.

2.5 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by hot-dip process to AESS indicated for galvanizing according to ASTM A123/A123M. Fabricate such that all connections of assemblies are made in the field with bolted connections where possible.

2.6 MATERIALS

A. General: Meet requirements of Section 05 12 00 - Structural Steel Framing as amended below.

B. Tension Control, High-Strength Bolts, Nuts, and Washers: Per Section 05 12 00 - Structural Steel Framing, Tension Control Bolts. Provide standard carbon steel finish rounded bolt heads with twist off bolts; ASTM F3125/F3125M.

2.7 SOURCE QUALITY CONTROL

A. Refer to Section 01 40 00 - Quality Requirements, for additional requirements.

B. Structural Requirements:
   1. Comply with quality control requirements per AISC 360, Chapter N and AISC 303, Section 10. Refer to Section 05 12 00 - Structural Steel Framing for additional requirements.
   2. Quality assurance agency to review work for compliance with requirements of AISC 360, Chapter N and AISC 303, Section 10.

C. AESS 1 and 2 Acceptance: The Architect shall observe AESS in the shop at a viewing distance consistent with final installation and determine acceptability based on qualification data and submittals. Quality assurance agency has no responsibility for enforcing requirements related to aesthetic effect.

D. AESS 3, 4, and C Acceptance: The Architect shall observe AESS in the shop at a viewing distance consistent with final installation and determine acceptability based on approved mock-up. Quality assurance agency has no responsibility for enforcing requirements related to aesthetic effect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Erector to check all AESS members upon delivery for twist, kinks, gouges or other imperfections which may result in rejection of appearance of member. Coordinate remedial action with fabricator prior to erecting steel.

3.2 PREPARATION

A. Provide connections for temporary shoring, bracing and supports only where noted on approved fabrication documents. Temporary connections not shown are to be made at locations not exposed to view in final structure or as approved by Architect.

B. Handle, lift and align pieces using nylon straps or chains with softeners required to maintain appearance of AESS through process of erection.

3.3 ERECTION

A. AESS 1 and 2: Basic elements; feature elements not in close view:
   1. Employ special care to handle and erect AESS. Erect finished pieces using nylon straps or chains with softeners such that they are not damaged.
   2. Place weld tabs for temporary bracing and safety cabling at points concealed from view in completed structure or where approved by Architect during pre-installation meeting. Obtain Architect approval of methods for removing temporary devices and finishing AESS members prior to erection.
   3. AESS Erection Tolerances: Erect to standard frame tolerances for structural steel per Chapter 7 of AISC 303.
   4. Set AESS accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
   5. Remove blemishes or unsightly surfaces resulting from temporary braces or fixtures.
   6. Remove all backing and run out tabs.
   7. When temporary braces or fixtures are required to facilitate erection, take care to avoid any blemishes, holes or unsightly surfaces resulting from use or removal of such temporary elements.

8. Bolted Connections: Align bolt heads on same side of connection as indicated on approved fabrication or erection documents.
9. Welded Connections: Comply with AWS D1.1/D1.1M and Section 05 12 00. Appearance and quality of welds to be consistent. Employ methods that will maintain alignment of members without warp exceeding tolerance of this section.
10. Remove weld spatter exposed to view.
11. Grind off projections larger than 1/16 inch at field butt and plug welds.
12. Continuous Welds: Where continuous welding is noted on drawings, provide continuous welds of a uniform size and profile.
13. Do not enlarge holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts. Replace connection plates that are misaligned where holes cannot be aligned with acceptable final appearance.
14. Splice members only where indicated.
15. Obtain permission for any torch cutting or field fabrication from Architect. Finish sections thermally cut during erection to a surface appearance consistent with mock-up.

B. AESS 3: Feature elements in close view:
1. Erect to requirements of AESS 1 and 2 and as follows:
2. Field Welding: Weld profile, quality, and finish to be consistent with mock-ups approved prior to fabrication.
3. Provide a continuous appearance to all welded joints including tack welds. Provide joint filler at intermittent welds.

C. AESS 4: Showcase elements:
1. Erect to requirements of AESS 3 and as follows:
2. Grind welds smooth.
3. Minimize Weld Show Through: At locations where welding on far side of an exposed connection creates distortion, grind distortion and marking of steel to a smooth profile with adjacent material.
4. Filling of Weld Access Holes: Where holes must be cut in web at intersection with flanges on W shapes and structural tees to permit field welding of flanges, fill holes with joint filler.
5. Where welds are indicated to be ground, contoured, or blended, oversize welds as required and grind to provide a smooth transition and match profile on approved mock-up.

3.4 FIELD QUALITY CONTROL

A. Refer to Section 01 40 00 - Quality Requirements for additional requirements.

B. Structural Requirements:
1. Comply with quality control requirements per AISC 360, Chapter N and AISC 303, Section 10. Refer to Section 05 12 00 - Structural Steel Framing for additional requirements.
2. Quality assurance agency to review work for compliance with requirements of AISC 360, Chapter N and AISC 303, Section 10.

C. AESS 1 and 2 Acceptance: Architect to observe AESS in place and determine acceptability based on qualification data and submittals. Quality assurance agency has no responsibility for enforcing requirements related to aesthetic effect.

D. AESS 3, 4, and C Acceptance: Architect to observe AESS in place and determine acceptability based on qualification data and submittals as well as on approved mock- up. Quality assurance agency has no responsibility for enforcing requirements related to aesthetic effect.

3.5 CLEANING

A. Touch-up Painting: Complete cleaning and touch-up painting of field welds, bolted connections, and abraded areas of shop paint to blend with adjacent surfaces of AESS. Perform touch-up work in accordance with manufacturer's instructions and as specified in Section 09 90 00 - Painting and Coating.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas. Repair galvanized surfaces in accordance with ASTM A780/A780M.

END OF SECTION 05 12 13

SECTION 05 21 00 - STEEL JOISTS

PART 1 - GENERAL

1.01 SUMMARY:

A. Section Includes: Furnish all labor, materials, and equipment in connection with the furnishing, manufacture and erection of steel joists, including:
   1. Bridging.
   2. Ceiling extensions.
   3. Bearing plates.
   4. Side wall anchors.
   5. Extended ends.

B. Related Sections:
   1. Testing Laboratory Services
   2. Structural Steel - Section 05 12 00
   3. Steel Deck - Section 05 30 00

1.02 SUBMITTALS

A. Shop Drawings: Submit in conformance with Section 01 34 00, shop and erection drawings to include mark, number, type, location and spacing of joists; details of bridging, extended ends and attachment of supports.

B. Certified mill tests reports, evidencing conformance with the requirements of the ASTM and SJI Specifications, shall be submitted in quadruplicate.

C. Special steel joists marked "SP" on the drawings shall be designed by a Registered Professional Engineer in the State of Texas on behalf of the steel joist supplier. Sealed structural calculations for said special joists shall be submitted together with the shop drawings for the review of Structural Engineer.

1.03 QUALITY ASSURANCE

A. Qualifications:
   1. Steel Joists shall be manufactured by an approved manufacturer who is a member of the Steel Joist Institute.
   2. All fabrications, handling, erection and connections of steel joists shall be in conformance with the latest edition of the Specifications of the Steel Joist Institute and the governing Building Code. In cases of conflict, the more stringent shall govern.

B. Refer to Testing Laboratory Services.
   1. Testing for this Section shall be included under the applicable testing requirements for Section 05 12 00 - Structural Steel

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials shall conform to the following requirements:
   1. Steel: Steel bearing plates, bridging, wall anchors, etc. shall conform to ASTM A36
   2. Bolts: Bridging bolts shall conform to ASTM A307.
   3. Welding Electrodes: Welding electrodes shall conform to the requirements of the latest edition of A.S.T.M. Designation A233 with series #E70 of AWS 5.5 electrodes of submerged ARC Grade SAW-2.
   4. Steel Joists: As required by the S.J.I., with sizes and types as shown on the Drawings.
   5. Paint: Fed. Spec. TT-P-86G. Fabricator=s rust inhibitive paint.

PART 3 - EXECUTION

3.01 FABRICATION

A. Contractor alone shall be responsible for errors in fabrication and for correct fitting of joists.

B. Holes shall not be made or enlarged by burning, nor will burning of unfair holes in shop or field be permitted.

C. Scale, rust or other deleterious materials shall be removed from fabricated joists before shop coat of paint is applied.

D. Accessories: Provide all necessary sag rods, bridging, extended bottom chords and top chords, side wall anchors, wall connectors, headers and ceiling extensions.

E. Shop Paint: After fabrication, clean joists, bridging, anchors, etc. of rust, all mill scale, dirt or other foreign material by approved methods. Remove grease or oil with benzine or similar volatile cleaner. After cleaning joists, bridging, etc., give one (1) dip or airless pressure spray coat of specified paint not less than 1.5 mils thick.

F. Extended Ends:

   1. Provide extended ends for top chords where indicated. Extension members shall be designed as cantilever beams with their reactions carried back at least to the first panel point of the joist. Extended ends shall have a load capacity at least equal to that of the joist unless shown otherwise on the Drawings.

G. Design: Where the applicable loading or span configuration is other than a uniformly loaded simple span condition as covered by the Standard Load Tables

   adopted by the SJI, the joist manufacturer shall design the joist for the specific condition and submit complete design computations with the shop drawings. Computations shall be sealed by a Registered Professional Engineer in the State of Texas. Deflection of cantilever joists shall be limited to 1/500 of the cantilever

length. Joist girders shall also be designed by a Registered Engineer, if indicated on the drawings, with sealed calculations submitted for the Engineer/Architect's review.

3.02 ERECTION

A. Replace joists damaged by bending or warping during handling and erection.

B. Bridging shall conform to SJI Specifications unless detailed otherwise on the Drawings.

C. Minimum bearings and anchorage shall conform to SJI Specifications and/or the Drawings as related to particular type of support.

D. Set joists to lines, levels and spacing as indicated. Provide bearing plates as indicated or required to carry out structural requirements. Execute general handling and erection in accordance with SJI Specifications.

E. Joists shall be permanently fastened to supports and all bridging and anchorage completely installed before any construction loads, other than workmen, are placed on joists.

F. Execute welding in accordance with "Code of Arc and Gas Welding in Building Construction" of the American Welding Society as amended to date, and only by welding operators who have been certified within the previous six months.

G. After erection, field connections and all abraded places of shop paint shall be touched up with same kind of paint as shop coat.

H. Bottom chords of members shall not be welded until the full dead load of the roof is applied. Comply with all requirements for temporary safety and stability of the structure as required by OSHA guidelines.

END OF SECTION 05 21 00

SECTION 05 30 00 - METAL ROOF DECK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, Bidding Requirements, Contract Forms, Conditions of the Contract and

B. Division 1 – General Requirements apply to the work of this section.

1.2 WORK INCLUDED

A. Roof Decking

1.3 RELATED WORK

A. Section 05 21 00 – Steel Joists

1.4 QUALITY ASSURANCE

A. Welder Qualifications: Welders and welding procedures shall comply with requirements of ANSI/AWS D1.1 Structural Welding Code.

1.5 REFERENCES

A. American National Standards Institute (ANSI)/American Welding Society (AWS):
   1. ANSI/AWS D1.1-81 Structural Welding Code.

B. Underwriters Laboratories, Inc. (UL):
   1. Building Materials List January 1983

1.6 SUBMITTALS

A. Shop Drawings: Submit in accordance with Section 01340. Indicated type of deck, gage of metal, finish and shape and size of special pieces and accessories.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Roof Decking: Shall be of type, depth, and gauge shown on structural drawings and conform to steel deck Institutes roof deck specifications Product/Manufacturer, one of the following:

Vulcraft, a Div. of Nucor Corp.
Wheeling Corrugating Co.
CSI Metal Deck Group
H.H Robertson

B. Finish:
   1. Roof decking units shall have a baked shop coat of Galvanize (G-60).

C. Accessories
   1. Provide 20-gauge steel plates at vents and other openings and 14 gauge sump pans at roof drains.

2. Screws shall be self-drilling “TEKS” of size indicated on drawings.

PART 3 - EXECUTION

3.1 ERECTION

A. Placement: Place steel deck units on the supporting steel framework and adjust to final position before fastening permanently. Bring each unit to proper bearing on the supports. Place units in straight alignment and with a minimum of clearance between ends of abutting units. Deck units shall be continuous over at least three spans.

B. Fastening: Size, Spacing, Type, and location of support and side lap connections shall be as indicated on structural drawings.

C. Openings: As the steel deck units are erected, cut and form the holes and openings which are located and dimensioned on the drawings. Holes required for the work of other trades will be cut by the trades requiring them. Provide deck reinforcing for openings and underside of metal deck.

D. Where interior partitions are indicated to extend to the underside of roof metal deck, provide manufacturer’s standard rubber closure installed to fill all voids between top of partitions and underside of metal deck.

E. Furnish sump pans for roof drains, per manufacturer’s standards.

F. Heavily damaged roof deck coating shall be wire brushed, cleaned and recoated with the same type of coating specified for deck.

END OF SECTION 05 30 00

SECTION 05 31 00 - METAL FLOOR DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, Bidding Requirements, Contract Forms, Conditions of the Contract and Division 1 – General Requirements apply to the work of this section.

1.2 WORK INCULUDED

A. Metal floor deck

1.3 RELATED WORK

A. Structural Steel – Section 05 21 00

1.4 QUALITY ASSURANCE

A. Welder Qualifications: Welders and welding procedures shall comply with the requirements of ANSI/AWS D1.1 Structural Welding Code.

B. Label construction: Floor deck units shall be listed by Underwriters Laboratories as “Steel Floor and Form Unit” and shall bear the UL Classification Marking.

1.5 REFERENCES

A. American National Standards Institute (ANSI)/ American Welding Society (AWS):

B. Underwriters Laboratories, Inc. (UL):
1. Building Materials List January 1983

1.6 SUBMITTALS

A. Shop Drawings: Submit in accordance with Section 01 34 00. Indicated type of deck, gage of metal, finish, and shape and size of special pieces and accessories.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Floor deck: Provide deck of thickness and depth called for in structural drawings. Following supplies are acceptable: Omega Building Products, Inc., Vulcraft, a division of Nucor Corp., Wheeling Corrugating Co.

B. Finish:
1. Floor deck units shall have a light commercial class zinc coating (G-60).

PART 3 - EXECUTION

3.1 ERECTION

A. Placement: Place steel deck units on the supporting steel framework and adjust to final position before fastening permanently. Bring each unit to proper bearing on the supports. Place units in straight alignment and with a minimum of clearance between ends of abutting units. Deck units shall be continuous over at least three spans.

B. Fastening:
   1. Weld units to steel framework at ends and at intermediate supports with 5/8” diameter fusion welds. Space welds as called for in structural drawings. Use ½” welding washers for deck gages lighter than 22.
   2. Where no fastener spacing is shown on the drawings, fasten side joints of DECK together with no. 12 self-tapping screws minimum of 2 per span.
   3. Deck fastening system shall meet or exceed the required diaphragm resistance noted on the drawings.

C. Openings: As the steel deck units are erected, cut and form the holes and openings which are located and dimensioned on the drawings. Holes required for the work of other trades will be cut by the trades requiring them. Provide deck reinforcing for openings as recommended by the manufacturer.

D. Where interior partitions are indicated to extend to the underside of metal floor deck, provide manufacturer’s standard rubber closure installed to fill all voids between top of partitions and underside of metal deck.

END OF SECTION 05 31 00

SECTION 05 31 40 - COMPOSITE STEEL FLOOR DECK

PART I - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 - Specification sections, apply to work of this section.

1.2 SCOPE OF WORK

A. Supplier: The composite steel floor deck supplier shall furnish all metal deck materials and accessories indicated on the Architectural, Structural, and Mechanical Drawings required to produce a complete job including but not necessarily limited to deck units, cover plates, pour stops, hanger slots or clips, metal deck edge closures, cell closures and all related accessories.

B. Erector: The Subcontractor responsible for erecting the composite steel floor deck shall provide all labor and equipment as required to place all steel deck components and accessories as described above.

1.3 QUALIFICATIONS

The composite steel floor deck supplier shall be a manufacturer with a minimum of two years successful experience and with a minimum of two successful jobs of a comparable size and scope to this project.

1.4 QUALITY ASSURANCE

The Contractor is responsible for quality control, including workmanship and materials furnished by his subcontractors and suppliers.

A. Codes and Standards: Comply with provisions of the following codes and standards except as otherwise indicated or specified.
   1. “Design Manual for Composite Decks, Form Decks, and Roof Decks,” as published by the Steel Deck Institute (SDI).
   2. “Specification for the Design of Cold Formed Steel Structural Members,” as published by the American Iron and Steel Institute (AISI).
   3. “Structural Welding Code-Steel,” as published by the American Welding Society (AWS).

B. Qualification of Field Welding: Qualify welding processes and welding operators in accordance with AWS procedures.

C. Underwriters Label: Provide composite steel floor deck units which are listed and conform to Underwriters Laboratories “Fire Resistance Directory,” with each deck unit bearing the UL label and marking for specific system detailed.

1.5 SUBMITTALS

A. Product Certification: Submit manufacturer’s specifications and installation instructions for each type of deck specified. Also submit a certificate of produce compliance with SDI Standards as specified.

B. Shop Drawings: Submit detailed shop drawings showing type of deck, complete layout, attachment details, closures, edge strips, supplementary framing, and all other accessories.

Also, show shear stud layout on all support beams.

C. Calculations: The composite steel floor deck manufacturer shall submit design calculations sealed by a registered professional engineer in the state where the project is located verifying compliance with the specifications for all load and span conditions shown on the drawings.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

See General Notes on the drawings for location of composite steel floor deck types and for depth of deck, minimum deck thickness, concrete type, total slab thickness, slab reinforcing, and design superimposed loads. The average rib width to depth of deck ratio shall be greater than or equal to 2.0. The deck thickness specified shall be considered the minimum thickness. The deck manufacturer shall be responsible for selecting the required deck thickness to carry the design superimposed load indicated for all the spans shown on the drawings and for meeting all performance criteria as specified by the SDI.

Acceptable manufacturers include the following:

Bowman/E.G. Smith, Div. Cyclops Corp.
Epic Metals Corp.
Mac-Fab Products
Roll Form Products
H.H. Robertson
Vulcraft/Div. Nucor Corp.
Wheeling Corrugating Co.
Omega Metal Building Products, Inc.
United Steel Deck, Inc.

Other manufacturers may be used only with Architect/Engineer approval.

2.2 GRADE OF STEEL

Composite steel floor deck shall be cold formed from steel sheets conforming to ASTM A611 Grade C or ASTM A4446 Grade A, with a minimum yield strength of 33 ksi. The delivered thickness of the uncoated steel shall not be less than 95% of design thickness. Sheet metal accessories shall conform to ASTM A526, commercial quality.

2.3 FINISH

A. Galvanized: Composite steel floor deck shall be galvanized with a protective zinc coating conforming to ASTM A525 G60.

B. Galvanizing Repair Paint: High zinc-dust content paint for repair of damaged galvanized surfaces complying with Military Specifications MIL-P-21035 (Ships).

2.4 RELATED PRODUCTS

A. Flexible Closure Strips: Provide manufacturers standard vulcanized closed cell, synthetic rubber.

B. Acoustic Sound Barrier Closures: Provide manufacturers standard mineral fiber closures.

2.5 FABRICATOR

A. Composite Steel Floor Deck Spans: Deck spans shall not exceed the maximum clear spans as required by SDI criteria. Where possible, all floor deck shall extend over three or more

spans. Simple span deck will not be permitted unless it is shored at midspan. All floor deck shall be designed as unshored construction unless indicated otherwise on the drawings. Any additional concrete topping specified over the composite slab shall be placed after the slab has reached 75% of its design strength.

B. Composite Steel Floor Deck Units: Fabricate deck units with integral embossing or raised pattern to furnish mechanical bond with concrete slabs. Fabricate deck units with fluted section having interlocking side laps.

C. Metal Closure Strips: Fabricate steel closure strips of not less than 0.071" minimum (14 gage) cold formed sheet steel. Form to provide tight fitting closures at open ends of cells or flutes and sides of decking. Provide sheet metal closures at all slab edges, columns, walls, and openings unless steel angles or bent plates are specified in details on the drawings. Also, provide closures wherever the deck stops or changes direction. Weld closure at edge supports with 1" long weld at 12" maximum centers unless shown otherwise on the drawings. Provide minimum 2" bearing over steel support. Closures and support welds shall be designed to support the wet weight of concrete and a 150 pound concentrated load acting at the slab edge without exceeding a stress of 0.8 FY and the wet concrete weight alone without exceeding a stress of 0.6 FY and a deflection of 3/4" maximum.

2.6 COMPOSITE SLAB REINFORCEMENT

A. Minimum Reinforcement: Composite steel floor deck slabs shall be reinforced as indicated on the drawings. All slabs, whether scheduled or not, shall be reinforced as a minimum with welded wire fabric having a minimum area of 0.00075 times the area of concrete above the deck but not less than 6 X 6 W1.4 x W1.4. All welded wire fabric shall conform to ASTM A 185 and be placed in flat sheets only.

B. Placement of Slab Reinforcement
   1. Temperature Reinforcement:
      a. Provide 3/4" clean cover to all temperature slab reinforcement by tying welded wire fabric to a continuous #5 reinforcing bar placed over each beam and girder and a maximum spacing of 48" centers each direction. Tie #5 bars and place on a high chair at each intersection point. High chairs shall be manufactured specifically for steel floor deck (CRSI Type HCM).

2.7 OPENINGS IN STEEL FLOOR DECK SLAB

For all openings in steel floor deck not framed with structural steel and greater tan 10" in width in either direction, provide 1 - #5 x opening width plus 4'-0" in a direction perpendicular to deck ribs at each side of opening with bars bearing on top of ribs and 2-#5 x deck span plus 1"-0" past nearest support beam at each side of opening chaired 3/4" up from bottom of nearest deck rib running beside the opening from support to support. Provide block out in slab for opening with deck uncut. Cut deck at opening after concrete has reached 75% of its design strength.

2.8 CHLORIDE ADMIXTURES

The use of admixtures in concrete containing chloride salts shall not be permitted for metal deck concrete.

2.9 EXTRA CONCRETE REQUIRED BY DECK DEFLECTION

The General Contractor shall include in his bid additional concrete required for metal deck slabs to account for deck deflection.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install deck units and accessories in accordance with manufacturers' recommendations and approved shop drawings, and as specified herein:
   1. Place deck units on supporting framework and adjust to final position with ends accurately aligned and bearing 1-1/2" minimum on supporting members before being permanently fastened. Do not stretch or contract side lap interlocks.
   2. Place deck units in straight alignment for entire length of run of cells and with close alignment between cells at ends of abutting units.
   3. Place deck units flat and square, secured to adjacent framing without warp or excessive deflection.
   4. Do not place deck units on concrete supporting structure until concrete has cured and is dry.
   5. Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.
   6. Do not use floor deck units for storage or working platforms until permanently secured.

B. Attachment of Composite Deck:
   1. Typical Welding of Deck: Metal deck units shall be welded to the structural support members with 5/8" _ puddle welds at each end of sheet and each intermediate support at a maximum spacing of 12" centers, unless more frequent attachment is specified on the drawings. Where two deck units abut each other, each unit will be so welded. Secure decks to each supporting member in edge ribs where side laps occur. Shear studs welded through a deck may be used in lieu of five/8" diameter puddle welds.
   2. Minimum Bearing; Provide a minimum deck bearing of 1-1/2" over all supports.

C. Welding Requirements: Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work.

D. Cutting and Fitting: Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking.

E. Reinforcement at Openings: Provide additional metal reinforcement and closure pieces as required for strength continuity of decking and support of other work shown on the drawings.

F. Hanger Slab or Clips: Provide UP approved punched hanger slots between cells or flutes of lower element where floor deck units are to receive hangers for support of ceiling construction, air ducts, diffusers, or lighting fixtures.
   1. Hanger clips designed to clip over male side lap joints of floor deck units may be used instead of hanger slots.
   2. Locate slots or clips at not more than 14" o.c. in both directions, not over 9" from walls at ends, and not more than 12' from walls at sides, unless otherwise shown.
   3. Provide manufacturer's standard hanger attachment devices.
   4. Loads hanging from metal deck slabs shall not exceed 100 pounds unless specifically detailed otherwise on the drawings.

G. Joint Covers: Provide metal joint covers at abutting ends and changes in direction of deck units, except where taped joints are specified.

3.2 TOUCH-UP PAINTING

After deck installation, wire brush, clean and paint scarred areas, welds and rust spots on top and bottom surfaces of decking units and supporting steel members.

Touch-up galvanized surfaces with galvanizing repair paint applied in accordance with manufacturers' instructions.

Touch-up painted surfaces with same type of shop paint used on adjacent surfaces.

In areas where s hop-painted surfaces are to be exposed, apply touch-up paint to blend into adjacent surfaces.

3.3 INSPECTION

Welded decking in place is subject to inspection and testing by the Owner's Testing Laboratory. Expense of removing and replacing portions of decking for testing purposes will be borne by Owner if welds are found to be satisfactory. Remove work found to be defective and replace with new acceptable work. Cost of such removal and replacement shall be borne by the Contractor.

END OF SECTION 05 31 40

SECTION 05 40 00 - COLD FORMED METAL FRAMING

PART 1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Load bearing wall framing.
   2. Exterior non-load bearing wall framing.
   3. Floor joist framing.
   4. Roof rafter framing.
   5. Ceiling joist framing.
   6. Soffit framing.
   7. Accessories necessary for a complete installation.

B. Related Sections:

1.3 REFERENCE STANDARDS

A. ACI 318 - Building Code Requirements for Structural Concrete; 2019 (Reapproved 2022).

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

D. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members; 2015.

E. ASTM C780 - Standard Test Methods for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2023.

F. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2020.

G. ASTM C1513 - Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections; 2018.

H. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.

I. ASTM E488/E488M - Standard Test Methods for Strength of Anchors in Concrete Elements; 2022.

J. ASTM E1190 - 2021 Edition, November 15, 2021, Standard Test Methods for Strength of Power-Actuated Fasteners Installed in Structural Members; 2021 Edition, November 15, 2021.

K. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2018.

L. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2017, with Editorial Revision (2020).

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance - Delegated design engineer shall provide cold-formed steel framing designs capable of withstanding all code required design loads within limits and under conditions indicated on the construction documents and within this Specification:
   1. Design loads: Designs shall be capable of withstanding the worst case loading as indicated on the structural drawings, and/or as required by the locally adopted Building Code. The design shall cover the worst case loading in all instances.
   2. Coordinate the requirements on the structural and architectural Drawings with the requirements of this Section. If a conflict exists, notations on the structural drawings take precedence.

3. The following document governs the Work, except where more restrictive items are specified:
    a. AISI Design of Cold-Formed Steel Structural Members Wind Load:
        1) Minimum design loads for exterior and/or load bearing and/or soffit applications:
            (a) As required by code officials having jurisdiction.
            (b) Deflection: 1/600 for clear simple spans.
            (c) Deflection: 1/300 for cantilever conditions and roof parapets.
            (d) Gauge: 16 gauge minimum, unless noted otherwise.
        2) Minimum design loads for interior and/or exterior suspended furr-downs with a maximum vertical drop on either side of 5 feet or greater:
            (a) As required by Authorities Having Jurisdiction (AHJ).
            (b) Deflection: 1/600 for clear simple spans.
            (c) Deflection: 1/300 for cantilever conditions and roof parapets.
            (d) Gauge: 20 gauge minimum, unless noted otherwise.
4. It is a common practice for studs thinner than 20 gauge to be crimped and/or ribbed to increase the strength of the overall stud cross section for various loading applications. These studs are typically noted by manufacturer as “equivalent” to a thicker gauge. These “equivalent” type studs are not allowed in a vertically suspended application with greater than 5 feet of vertical wall drop, 20 gauge is the minimum thickness allowed for these applications.
5. Welding qualifications: Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure."
6. Studs, tracks, channels, and other light gauge framing members shall conform to requirements of ASTM C955.
7. Fire-Rated Assemblies: Where framing units are components of assemblies indicated for a fire-resistance rating, including those required for compliance with governing regulations, provide units that have been approved by governing authorities that have jurisdiction.
8. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 degrees F.
9. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure:
    a. Upward and downward movement of 1-1/2 inch.
10. Design exterior non-load bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

B. Cold Formed Steel Framing Design Standards:
1. Wall studs: AISI S211.
2. Headers: AISI S212.
3. Lateral design: AISI S213.

1.5 SUBMITTALS

A. Product Data: Technical data for cold formed steel framing product and accessories including factory applied primers.

B. Shop Drawings:
1. Submit layout, spacings, sizes, thickness, and types of cold formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners:
    a. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
    b. Shall bear the seal of a Registered Professional Engineer, licensed in the State of Texas.

C. Supplementary Design Details: The general design is presumed adequate to permit compliance with the specified performance. Provide engineering calculations and shop drawings to supplement the general design. Calculations shall bear the seal of a Registered Professional Engineer, licensed in the State of Texas. Calculations and shop drawings must show design will withstand wind loading commiserate with class and rating of the Project.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Welding qualifications:
      a. Qualify procedures and personnel according to the following:
         1) AWS D1.3/D1.3M Structural Welding Code - Sheet Steel.
         2) CCFSS Technical Bulletin: “AISI Specification Provision for Screw Connections.”
   2. Comply with AISI North American Specification for the Design of Cold Formed Steel Structural Members and Standard for Cold Formed Steel Framing - General Provisions:
      a. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.
   3. Fire Resistance Ratings: ASTM E119; testing by a UL. Identify products with appropriate markings of applicable testing agency. Indicate design designations from UL Fire Resistance Directory.
   4. Installer qualifications: Company specializing in the installation of cold formed metal framing components with minimum five (5) years’ documented experience.
   5. Install system to provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
   6. Install system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.
   7. Mill certificates signed by steel sheet producer indicating steel sheet complies with requirements, including uncoated steel thickness, yield strength, tensile strength, total elongation, chemical requirements, and galvanized-coating thickness.

B. Professional Engineer Qualifications:
   1. A professional engineer who is legally qualified to practice in the State of Texas and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold formed metal framing that are similar to those indicated in material, design, and extent:
      a. Engineering Responsibility: Preparation of shop drawings, design calculations, and structural data.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect cold formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling.

B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Manufacturers listed whose products meet or exceed the specifications are approved for use in the Work. Other manufacturers must have a minimum of five (5) years’ experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.
   1. CEMCO.
   2. ClarkDietrich Building Systems.
   3. Consolidated Fabricators Corp.
   4. SCAFCO Corporation.

B. Substitutions: Refer to Section - 01 25 00 - Substitution Procedures.

2.2 LOAD BEARING WALL FRAMING

A. Steel Studs:
   1. C-shaped steel studs, of web depths indicated, punched, with stiffened flanges:
      a. Minimum Base Metal Thickness: 0.0538 inch, 0.0677 inch, and 0.0966 inch.
      b. Flange Width: 1-5/8 inches.
      c. Section Properties: As indicated on Drawings.

B. Steel Track:
   1. U-shaped steel track, of web depths indicated, unpunched, with straight flanges:
      a. Minimum Base Metal Thickness: 0.0538 inch, 0.0677 inch, and 0.0966 inch.
      b. Flange Width: 1-1/4 inches.

C. Steel Box or Back-to-Back Headers:
   1. C-shape used to form header beams, of web depths indicated, unpunched, with stiffened flanges:
      a. Minimum Base Metal Thickness: 0.0538 inch, 0.0677 inch, and 0.0966 inch.
      b. Flange Width: 1-5/8 inches.

D. Steel Single or Double L Headers:
   1. L-shapes used to form header beams, of web depths indicated:
      a. Minimum Base Metal Thickness: 0.0538 inch, 0.0677 inch and 0.0966 inch.
      b. Top Flange Width: 1-5/8 inches.
      c. Section Properties: As indicated on Drawings.

2.3 EXTERIOR NONLOAD BEARING WALL FRAMING

A. Steel Studs:
   1. C-shaped steel studs, of web depths indicated, punched, with stiffened flanges:
      a. Minimum Base Metal Thickness: 0.0538 inch, 0.0677 inch , and 0.0966 inch .
      b. Flange Width: 1-5/8 inches.
      c. Section Properties: As indicated on Drawings.

B. Steel Track:
   1. U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
      a. Minimum Base Metal Thickness: 0.0538 inch, 0.0677 inch , and 0.0966 inch .
      b. Flange Width: 1-1/4 inches.

C. Vertical Deflection Clips:
   1. Head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web:
      a. Manufacturers listed whose products meet or exceed the specifications are approved for use in the Work. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.
         1) ClarkDietrich Building Systems.
         2) SCAFCO Corporation.
         3) Simpson Strong-Tie Co., Inc.
         4) Steeler, Inc.
         5) Substitutions: Refer to Section - 01 25 00 - Substitution Procedures.

D. Single Deflection Track:
   1. Single, deep leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure:
      a. Minimum base metal thickness: 0.0428 inch , 0.0538 inch, 0.0677 inch , and 0.0966 inch.

b. Flange width: One inch plus the design gap for one story structures and one inch plus twice the design gap for other applications.

E. Double Deflection Tracks:
1. Double, deep leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges:
a. Outer track - Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal loads and transfer them to the primary structure:
1) Minimum base metal thickness: 0.0428 inch, 0.0538 inch), 0.0677 inch , and 0.0966 inch..
2) Flange width: 1 inch plus the design gap for one story structures and 1 inch plus twice the design gap for other applications.
2. Inner track - of web depth indicated:
a. Minimum base metal thickness: 0.0428 inch, 0.0538 inch, 0.0677 inch, and 0.0966 inch.
b. Flange width: 1 inch plus the design gap for one story structures and 1 inch plus twice the design gap for other applications.

F. Drift Clips: Bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.4 CEILING JOIST FRAMING

A. Steel Ceiling Joists:
1. C-shaped steel sections, of web depths indicated, punched with standard holes, with stiffened flanges:
a. Minimum Base Metal Thickness: 0.0428 inch .
b. Flange Width: 2 inches minimum.

2.5 SOFFIT FRAMING

A. Exterior Soffit Frame:
1. C-shaped steel sections, of web depths indicated, with stiffened flanges:
a. Minimum Base Metal Thickness: 0.0428 inch.
b. Flange Width: 1-5/8 inches minimum.

2.6 FRAMING ACCESSORIES

A. Fabricate steel framing accessories from steel sheet, ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of appropriate thickness and configuration, unless otherwise indicated:
1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Gusset plates.
8. Stud kickers and knee braces.
9. Joist hangers and end closures.
10. Hole reinforcing plates.
11. Backer plates.

C. Anchors, Clips, and Fasteners:
1. Steel Shapes and Clips: ASTM A36/A36M, zinc coated by hot dip process according to ASTM A123/A123M.
2. Expansion anchors: Fabricated from corrosion resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI

318 greater than or equal to the design load, as determined by testing per ASTM E488/E488M conducted by a qualified testing agency.

3. Power actuated anchors: Fastener system of type suitable for application indicated, fabricated from corrosion resistant materials, with allowable load capacities calculated, greater than or equal to the design load, as determined by testing per ASTM E1190 conducted by a qualified testing agency.
4. Mechanical fasteners:
   a. ASTM C1513 ASTM C1513, corrosion resistant coated, self-drilling, self-tapping, steel drill screws:
      1) Head type: Low profile head beneath sheathing.
5. Welding electrodes: Comply with AWS standards.

D. Miscellaneous Materials:
1. Galvanizing Repair Paint: SSPC-Paint 20 or ASTM C780.
2. Non-Metallic, Non-Shrink Grout: Premixed, non-metallic, non-corrosive, non-staining grout containing selected silica sands, portland cement, shrinkage compensating agents, and plasticizing and water reducing agents, complying with ASTM C1107/C1107M, with fluid consistency and 30-minute working time.
3. Shims: Load bearing, high density multimonomer plastic, and non-leaching; or of cold formed steel of same grade and coating as framing members supported by shims.
4. Sealer Gaskets: Closed cell neoprene foam, 1/4 inch thick, selected from standard widths to match width of bottom track or rim track members.

2.7 FABRICATION

A. Fabricate cold formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI specifications and standards, manufacturer written instructions, and specified requirements:
1. Fabricate framing assemblies using jigs or templates.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted:
   a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
   b. Locate mechanical fasteners and install according to shop drawings, with screw penetrating joined members by no fewer than three (3) exposed screw threads.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

C. Fabrication Tolerances:
1. Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in ten (10) feet (1:960) and as follows:
   a. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
   b. Squareness: Fabricate each cold formed steel framing assembly to a maximum out of square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the work.

3.2 PREPARATION

A. Before sprayed fire resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. After applying sprayed fire resistive materials, remove only as much as necessary to complete installation of cold formed framing without reducing thickness of fire resistive materials below required thickness to obtain fire resistance rating indicated. Protect remaining fire resistive materials from damage.

C. Install load bearing shims or grout between the underside of load bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch (6 mm) to ensure a uniform bearing surface on supporting concrete or masonry construction.

D. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 ERECTION

A. General:
   1. Track Anchors: Install anchors maximum 4 feet on center; design anchors and spacing to carry live, dead, and wind loads.
   2. Track Splices: Provide channel inserts or weld track splices.
   3. Erection: Install members plumb, level, and in a true plane.
   4. Fastenings: Make assembly rigid and secure, with welds free of voids and burnouts.

B. Install metal framing systems in accordance with stud manufacturer's printed instructions.

C. Runner Tracks:
   1. Install continuous tracks sized to match studs.
   2. Align tracks accurately to layout at base and tops of studs.
   3. Secure tracks as recommended by stud manufacturer, except do not exceed 24 inches on center for nail or power-driven fasteners, nor 16 inches on center for other types of attachment.
   4. Provide fasteners at corners and ends of tracks.
   5. Tracks shall be anchored to structural steel prior to installing sprayed on insulation.
   6. Provide deflection track (DT), at top of stud walls at floor or roof above, typically. Allow for 1/2 inch movement of primary structure. Do not attach studs directly to deflection track.
   7. Vertical deflection clips: Provide manufacturer’s standard bypass and head clips, capable of accommodating upward and downward vertical displacement of primary structure.

D. Secure studs to top track and bottom runner track by means of approved self-drilling screws or welding at both inside and outside flanges of 14 gauge or heavier material. Screws and welds shall be of sufficient size to insure strength of connection. All welding shall comply with American Welding Society "Specification for Welding Sheet Steel in Structures."

E. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.

F. Where stud system abuts structural columns or walls, including masonry walls, anchor ends of stiffeners to supporting structure. Use Zee clips as specified above. Weld "Z" shaped clips to structural members as shown on drawings. Maximum 2 feet on center vertical.

G. Install supplementary framing, blocking, and bracing in the metal framing system wherever walls or partitions are indicated to support fixtures, equipment, services, casework, heavy trim and furnishings, and similar work requiring attachment to the wall or partition. Where type of supplementary support is not otherwise indicated, comply with the stud manufacturer's recommendations and industry standards in each case, considering the weight or loading resulting from the item supported.

H. Frame wall openings with extra studs, equal to the number of studs interrupted by wall openings, placed at each side of wall openings. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with shoes or by welding, and space jack

studs same as full-height studs of the wall. Secure stud system all around to wall opening frame in the manner indicated.

I. Install bracing/bridging in accordance with manufacturer's instructions and design conditions.

J. Touch up field welds and damaged galvanized coating, except touch up of field cut studs is not required.

K. Frame both sides of expansion and control joints with separate studs; do not bridge the joint with components of stud system.

L. Install horizontal stiffeners in stud system, space (vertical distance) at no more than 54 inches on center. Weld at each intersection.

3.4 JOIST INSTALLATION

A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.

B. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track:
   1. Install joists over supporting frame with a minimum end bearing of 1-1/2 inches .
   2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel stud sections as indicated on shop drawings.

C. Space joists not more than 2 inches from abutting walls:
   1. Joist Spacing: 16 inches .

D. Frame openings with built-up joist headers consisting of joist and joist track, or another combination of connected joists if indicated.

E. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated on shop drawings:
   1. Install web stiffeners to transfer axial loads of walls above.

F. Install bridging at intervals indicated on shop drawings. Fasten bridging at each joist intersection as follows:
   1. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and joist track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of joists and secure solid blocking to joist webs.

G. Secure joists to load bearing interior walls to prevent lateral movement of bottom flange.

H. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold down angles, anchors, and fasteners, to provide a complete and stable joist framing assembly.

END OF SECTION 05 40 00

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Steel tube reinforcement for low partitions.
   2. Loose steel lintels.
   3. Loose bearing and leveling plates.
   4. Miscellaneous steel, including steel angle corner guards and steel edgings.
   5. Accessories as necessary for complete installation.

1.3 REFERENCE STANDARDS

A. 29 CFR 1910.25 - Occupational Safety and Health Standards - Stairways; Current Edition.

B. 2012 TAS - Texas Accessibility Standards; 2012.

C. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements; 2008 (Reaffirmed 2018).

D. ASME A17.1 - Safety Code for Elevators and Escalators Includes Requirements for Elevators, Escalators, Dumbwaiters, Moving Walks, Material Lifts, and Dumbwaiters with Automatic Transfer Devices; 2022.

E. ASTM A27/A27M - Standard Specification for Steel Castings, Carbon, for General Application; 2020.

F. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

G. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999, with Editorial Revision (2022).

H. ASTM A48/A48M - Standard Specification for Gray Iron Castings; 2022.

I. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.

J. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

K. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

L. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2023a.

M. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2024.

N. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2018.

O. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.

P. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2023.

Q. ASTM A563/A563M - Standard Specification for Carbon and Alloy Steel Nuts (Inch and Metric); 2021a.

R. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

S. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

T. ASTM A741 - Standard Specification for Metallic-Coated Steel Wire Rope and Fittings for Highway Guardrail; 2011.

U. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2020.

V. ASTM A786/A786M - Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates; 2015 (Reapproved 2021).

W. ASTM A793 - Standard Specification for Rolled Floor Plate, Stainless Steel; 1996.

X. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.

Y. ASTM B26/B26M - Standard Specification for Aluminum-Alloy Sand Castings; 2018, with Editorial Revision.

Z. ASTM B36/B36M - Standard Specification for Brass Plate, Sheet, Strip, and Rolled Bar; 2023.

AA. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings; 2017.

BB. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

CC. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

DD. ASTM B241/B241M - Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube; 2022.

EE. ASTM B429/B429M - Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube; 2020.

FF. ASTM B455/B455M - Standard Specification for Copper-Zinc-Lead Alloy (Leaded-Brass) Extruded Shapes; 2020.

GG. ASTM B584 - Standard Specification for Copper Alloy Sand Castings for General Applications; 2022.

HH. ASTM B632/B632M - Standard Specification for Aluminum-Alloy Rolled Tread Plate; 2024.

II. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2019.

JJ. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2023.

KK. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.

LL. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2020.

MM. ASTM D1187/D1187M - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal; 1997 (Reapproved 2018).

NN. ASTM E488/E488M - Standard Test Methods for Strength of Anchors in Concrete Elements; 2022.

OO. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs; 2022.

PP. ASTM F594 - Standard Specification for Stainless Steel Nuts; 2022.

QQ. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength; 2020.

RR. ASTM F1941/F1941M - Standard Specification for Electrodeposited Coatings on Mechanical Fasteners, Inch and Metric; 2016.

SS. ASTM F2329/2329M - Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners; 2015.

TT. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2023.

UU. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).

VV. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2014, with Errata (2020).

WW. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2018.

XX. AWS D1.6/D1.6M - Structural Welding Code - Stainless Steel; 2017, with Amendment (2021).

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design ladders and countertop supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance of Ladders: Provide ladders and landings capable of withstanding the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.

C. Structural Performance:
   1. Countertops and Vanities: Provide countertop and vanity framing capable of withstanding the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections, or of exhibiting excessive deflections in any of the components making up the countertops and vanities:
      a. All deadloads.
      b. 500 pound live load placed on the countertop and vanity.
      c. Deflection at Midspan: L/1000 times span or 1/8 inch whichever is less.

D. Thermal Movements:
   1. Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss:
      a. Temperature change (range): 120 degrees F , ambient; 180 degrees F, material surfaces.

1.5 SUBMITTALS

A. Product Data: Submit data for miscellaneous metal fabrications and paint, coatings, and grout accessories.

B. Shop Drawings:
   1. Submit shop drawings detailing the fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items:
      a. For installed products indicated to comply with design loads, include structural analysis data, for information only, signed and sealed by the qualified professional engineer responsible for their preparation.

C. Delegated Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

D. Welding Certificates.

E. Paint Compatibility Certificates: Submit manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Building Code: Comply with applicable requirements of the IBC for metal fabrications.
   2. Welding - qualify procedures and personnel according to the following:
      a. AWS D1.1/D1.1M Structural Welding Code – Steel.
      b. AWS D1.2/D1.2M Structural Welding Code - Aluminum.
      c. AWS D1.3/D1.3M Structural Welding Code - Sheet Steel.
      d. AWS D1.6/D1.6M Structural Welding Code - Stainless Steel.
      e. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

B. Fabricator/Installer Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this work for a minimum of 5 years, with a record of successful in-service performance, with sufficient production capacity to produce required units without causing delay in the work.

C. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of metal fabrications that are similar to those indicated in material, design, and extent.

D. Exterior Product Approvals:
   1. Manufacturer shall certify that product complies with and has been tested and approved in compliance with Florida Product Approval or Miami Dade NOA and applicable requirements.
   2. Manufacturer shall certify that product complies with large [and small] missile impact criteria and has been tested and approved in compliance with Florida Product Approval or Miami Dade NOA and applicable requirements.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.
   1. Established Dimensions: Where field measurements cannot be made without delaying the work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
   2. Provide allowance for trimming and fitting at site.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store metal fabrications in a dry, well ventilated, weathertight place. Deliver and handle to prevent any type of damage to the fabricated work.

1.9 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Metal Surfaces, General:

1. Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
2. Slotted Channel Framing: Cold formed metal box channels (struts) complying with MFMA-4.
    a. Size of Channels: 1-5/8 inches by 1-5/8 inches.
    b. Material: Galvanized steel ASTM A653/A653M, commercial steel, Type B. with G90 (Z275) coating; 0.108 inch nominal thickness.
    c. Cold Formed Metal Channels: Flange edges returned toward web and with 9/16 inch wide slotted holes in webs at 2 inches o.c.
    d. Width of Channels: 1-5/8 inches.
    e. Depth of Channels: As indicated on Drawings.
    f. Metal and Thickness: Galvanized steel complying with ASTM A653/A653M, structural quality, Grade 33 (Grade 230), with G90 (Z275) coating; 0.108 inch nominal thickness.
    g. Finish: Hot dip galvanized after fabrication.
3. Fasteners: Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use and zinc plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
    a. Provide stainless steel fasteners for fastening aluminum.
    b. Provide stainless steel fasteners for fastening stainless steel.
    c. Provide stainless steel fasteners for fastening nickel silver.
    d. Provide bronze fasteners for fastening bronze.
    e. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563/A563M; and, where indicated, flat washers.
    f. Steel Bolts and Nuts: Regular hexagon head bolts, ASTM A325/A325M, Type 3; with hex nuts, ASTM A563/A563M, Grade C3 (ASTM A563M, Class 8S3); and, where indicated, flat washers.
    g. Stainless Steel Bolts and Nuts: Regular hexagon head annealed stainless steel bolts, ASTM F1554 (ASTM F738M); with hex nuts, ASTM F594 (ASTM F836M); and, where indicated, flat washers; Alloy.
    h. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563/A563M; and, where indicated, flat washers.
        1) Hot dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
    i. Anchors: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M , conducted by a qualified independent testing agency.
    j. Cast in Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A27/A27M cast steel. Provide bolts, washers, and shims as needed, all hot dip galvanized per ASTM F2329/2329M.
    k. Post Installed Anchors:
        1) Material for Interior Locations: Carbon steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
        2) Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) or Group 2 (A4) stainless steel bolts, ASTM F593 ASTM F593 (ASTM F738M), and nuts, ASTM F594 (ASTM F836M).
    l. Slotted Channel Inserts: Cold-formed, hot-dip galvanized steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with

temporary filler and tee head bolts, complete with washers and nuts, all zinc plated to comply with ASTM B633, Class Fe/Zn 5, as needed for fastening to inserts

B. Aluminum:
   1. Aluminum Plate and Sheet: ASTM B209/B209M, Alloy 6061-T6.
   2. Aluminum Extrusions: ASTM B221, Alloy 6063-T6.
   3. Aluminum Alloy Rolled Tread Plate: ASTM B632/B632M , Alloy 6061-T6.
   4. Aluminum Castings: ASTM B26/B26M, Alloy 443.0-F.

C. Bronze:
   1. Bronze Extrusions: ASTM B455/B455M, Alloy UNS No. C38500 (extruded architectural bronze).
   2. Bronze Plate, Sheet, Strip, and Bars: ASTM B36/B36M, Alloy UNS No. C28000 (muntz metal, 60 percent copper).
   3. Bronze Castings: ASTM B584, Alloy UNS No. C83600 (leaded red brass) or No. C84400 (leaded semired brass).

D. Cast Iron:
   1. Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.

E. Nickel:
   1. Nickel Silver Extrusions: ASTM B151/B151M, Alloy UNS No. C74500.
   2. Nickel Silver Castings: ASTM B584, Alloy UNS No. C97600 (20 percent leaded nickel bronze).

F. Stainless Steel:
   1. Stainless Steel Sheet, Strip, and Plate: ASTM A240/A240M or ASTM A666, Type 304.
   2. Stainless Steel Bars and Shapes: ASTM A276/A276M, Type 304.
   3. Rolled Stainless Steel Floor Plate: ASTM A793.

G. Steel:
   1. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
   2. Steel Pipe: ASTM A53/A53M, Standard Weight (Schedule 40) unless otherwise indicated.
   3. Steel Tubing: ASTM A500/A500M, cold formed steel tubing.
   4. Rolled Steel Floor Plate: ASTM A786/A786M, rolled from plate complying with ASTM A36/A36M or ASTM A283/A283M, Grade C or D.

H. Zinc Coated Steel Wire Rope: ASTM A741:
   1. Wire Rope Fittings: Hot dip galvanized steel connectors with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.

I. Abrasive Surface Floor Plate:
   1. Steel plate with abrasive granules rolled into surface or with abrasive material metallically bonded to steel:
      a. Manufacturers listed whose products meet or exceed the specifications are approved for use in the Work. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.
         1) IKG Industries, a division of Harsco Corporation.
         2) SlipNOT Metal Safety Flooring; W.S. Molnar Company.

J. Fasteners:
   1. Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use and zinc plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required:
      a. Provide stainless steel fasteners for fastening aluminum.
      b. Provide stainless steel fasteners for fastening stainless steel.
      c. Provide stainless steel fasteners for fastening nickel silver.

d. Provide bronze fasteners for fastening bronze.
e. Steel Bolts and Nuts: Regular hexagon head bolts, ASTM A307, Grade A with hex nuts, ASTM A563/A563M and, where indicated, flat washers.
f. Steel Bolts and Nuts: Regular hexagon head bolts, ASTM F3125/F3125M, Type 3 with hex nuts, ASTM A563/A563M, Grade C3 and, where indicated, flat washers.
g. Stainless Steel Bolts and Nuts: Regular hexagon head annealed stainless steel bolts, ASTM F593 with hex nuts, ASTM F594 and, where indicated, flat washers; alloy.
h. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563/A563M and, where indicated, flat washers:
    1) Hot dip galvanize or provide mechanically deposited zinc coating where item being fastened is indicated to be galvanized.
i. Anchors: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.
j. Post Installed Anchors: Torque controlled expansion anchors or chemical anchors
    1) Material for interior locations: Carbon steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
    2) Material for exterior locations and where stainless steel is indicated: Alloy; Group 1 (A1) or Group 2 (A4), ASTM F593, and nuts, ASTM F594.
k. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A27/A27M cast steel. Provide bolts, washers, and shims as needed, all hot dip galvanized per ASTM F2329/2329M.
l. Slotted Channel Inserts: Cold-formed, hot-dip galvanized steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee head bolts, complete with washers and nuts, all zinc plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

K. Miscellaneous Materials:
1. Shop Primer for Ferrous Metal: Universal primer, organic zinc rich primer, complying with SSPC-Paint 20 and compatible with topcoat. Provide 10-99 (red) or 10-09 (gray) by Tnemec Company.
2. Universal Shop Primer: Fast curing, lead and chromate free, universal modified alkyd primer and compatible with topcoat. Use primer containing pigments that make it easily distinguishable from zinc rich primer.
3. Water Based Primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel and compatible with topcoat.
4. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc coated metal and compatible with finish paint systems indicated.
5. Galvanizing Repair Paint: High zinc dust content paint for regalvanizing welds in steel, complying with SSPC-Paint 20. Provide Tneme-Zinc 90-97 by Tnemec Company.
6. Bituminous Paint: Cold applied asphalt emulsion complying with SSPC-Paint 12, containing no asbestos fibers, or cold applied asphalt emulsion complying with ASTM D1187/D1187M.
7. Non-shrink, Non-Metallic Grout: Factory packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
8. Concrete Materials and Properties: Composed of ASTM C150/C150M Type I Portland cement, ASTM C33/C33M sand and coarse aggregates and potable water to produce a low slump mix suitable for placement. Grade coarse aggregate from 1/8 inch with at least 95 percent passing a 3/8-inch sieve and not more than 10 percent passing a No. 8 sieve.

Fill shall be proportioned to provide a minimum 28-day compressive strength of 3,000 psi (20 MPa).

2.2 FABRICATION

A. Shop Assembly:

1. Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation:
   a. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
   b. Form bent metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
   c. Form exposed work with accurate angles and surfaces and straight edges.
   d. Weld corners and seams continuously to comply with the following:
      1) Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
      2) Obtain fusion without undercut or overlap.
      3) Remove welding flux immediately.
      4) At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
   e. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
   f. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
   g. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
   h. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
   i. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 inch by 1-1/2 inches, with a minimum 6 inch embedment and 2 inch hook, not less than 8 inches from ends and corners of units and 24 inches (o.c., unless otherwise indicated.
   j. Galvanize miscellaneous framing and supports at exterior locations; prime paint miscellaneous framing and supports at interior locations.
2. Miscellaneous Framing and Supports: Provide steel framing and supports necessary to complete the work and which are not a part of the structural framework, including but not limited to framing and supports for elevator hoistway beams, elevator sills, overhead lobby door frames, sliding doors, countertop and vanities, ceiling hung toilet compartments, and tube framing for partial height walls, CMU partition head supports, mechanical and electrical equipment.
   a. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction. Cut, drill, and tap units to receive hardware, hangers, and similar items.
      1) Fabricate units from slotted channel framing where indicated.
      2) Furnish inserts for units installed after concrete is placed.
   b. Framing for Ceiling Hung Toilet Compartments: Provide framing for ceiling hung toilet compartments, coordinated with the partitions and including provisions for partition anchorage as required to sustain imposed loads and to limit deflections to L/360 between hangers, fabricated from the following:

1) Structural Steel Shapes, Plates and Bars: ASTM A36/A36M.
2) Modular Structural Framing System: ASTM A569; modular, structural quality steel preformed U-channel framing system with continuous open slot prepared to receive attachment nuts, bolts, straps, threaded rods, beam clamps, hanger rods support brackets and other accessories. Provide corrosion resistant finish.
3) Provide steel rods, 1/2 inch diameter, spaced at maximum 36 inches o.c. Thread rods to receive anchor and stop nuts. Fit hangers with wedge shape washers for full bearing on sloping flanges of support beam.
4) Coordinate installation with toilet compartment manufacturer's written instructions and recommendations.

c. Galvanize miscellaneous framing and supports at exterior locations; prime paint miscellaneous framing and supports at interior locations.

2.3 MISCELLANEOUS FRAMING AND SUPPORTS

A. Provide steel framing and supports necessary to complete the work and which are not a part of the structural framework, including but not limited to the following:
1. Ceiling-hung toilet compartments.
2. Loose bearing and leveling plates
3. Loose steel lintels.

B. Fabrication, General:
1. Fabricate from steel shapes, plates, and bars of welded construction unless otherwise indicated.
2. Fabricate to sizes, shapes, and profiles indicated on Drawings and as necessary to receive adjacent construction. Cut, drill, and tap units to receive hardware, hangers, and similar items:
3. Cut, drill, and tap units to receive hardware, hangers, and similar items.
4. Fabricate units from slotted channel framing where indicated.
5. Provide inserts for units installed after concrete is placed.

C. Loose Bearing and Leveling Plates:
1. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction.
a. Drill plates to receive anchor bolts and for grouting.
b. Galvanize plates.

2.4 STAIRS

A. Prefabricated Aluminum OSHA Steps:
1. Stairs shall comply with 29 CFR 1910.25.
2. Materials:
a. Aluminum:
1) Sheet and Plate: 5052-H32 complying with ASTM B209/B209M.
2) Extruded Aluminum: 6005-T5, 6061-T6, or 6063-T52 complying with ASTM B221.
3) Seamless Extruded Tube: 6005-T5, 6061-T6, or 6063-T52 complying with ASTM B241/B241M.
4) Extruded Structural Pipe and Tube: 6005-T5, 6061-T6, or 6063-T52 complying with ASTM B429/B429M.
5) Finish: Mill.
b. Fasteners: 18-8 Stainless steel complying with ASTM F593.
3. Engineering: Prefabricated stairs shall be designed by a professional engineer licensed in the project state and shall comply with all applicable regulations.

2.5 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation from Plane: 1/16 inch in 48 inches.

2.6 FINISHES

A. Finish metal fabrications after assembly.

B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.7 ALUMINUM FINISHES

A. As-Fabricated Finish: AA-M12.

B. Clear Anodic Finish: AAMA 611, Class I, AA-M12C22A41.
   1. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: non-specular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 607.1.

2.8 STAINLESS STEEL FINISHES

A. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

B. Bright, Directional Polish: No. 4 finish.

C. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

2.9 STEEL AND IRON FINISHES

A. Galvanizing:
   1. Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products:
      a. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.

C. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

D. Preparation for Shop Priming:
   1. Prepare surfaces to comply with requirements indicated below:
      a. Exterior items: SSPC SP6/NACE No. 3, "Commercial Blast Cleaning."
      b. Items indicated to receive zinc-rich primer: SSPC SP6/NACE No. 3, "Commercial Blast Cleaning."
      c. Items indicated to receive primers specified in Section 09 96 00 - High-Performance Coatings: SSPC SP6/NACE No. 3, "Commercial Blast Cleaning."
      d. Other items: SSPC SP3, "Power Tool Cleaning."

E. Shop Priming:
   1. Apply shop primer to comply with SSPC PA1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting:
      a. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

3.2 FIELD CONDITIONS

A. Field Measurements:
   1. Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication:
      a. Established dimensions: Where field measurements cannot be made without delaying the work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
      b. Provide allowance for trimming and fitting at site.

3.3 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation, with edges and surfaces level, plumb, true, and free of rack, and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding:
   1. Comply with the following requirements:
      a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
      b. Obtain fusion without undercut or overlap.
      c. Remove welding flux immediately.
      d. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection:
   1. Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
      a. Cast aluminum: Heavy coat of bituminous paint.
      b. Extruded aluminum: Two (2) coats of clear lacquer.

3.4 INSTALLING BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with non-shrink grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.5 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on shop drawings.

B. Anchor supports for ceiling-hung toilet partitions securely to, and rigidly braced from, building structure.
   1. Ceiling Hung Toilet Partitions: Anchor supports securely to, and rigidly brace from, overhead building structure.

3.6 ERECTION TOLERANCES

A. Maximum Variation from Plumb: 1/4 inch per story, noncumulative.

B. Maximum Offset from True Alignment: 1/4 inch.

C. Maximum Out of Position: 1/4 inch.

3.7 ADJUSTING AND CLEANING

A. Touchup Painting:
   1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC PA1 for touching up shop painted surfaces:
      a. Apply by brush or spray to provide a minimum 2.0 mil dry film thickness.
   2. Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 09 90 00 - Painting and Coating.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 05 50 00

SECTION 05 51 00 - METAL STAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Preassembled steel stairs.
   2. Concrete-filled metal pan stairs.
   3. Accessories necessary for a complete installation.

B. Related Sections:
   1. Section 03 30 00 - Cast-In-Place Concrete.
   2. Section 05 52 00 - Metal Railings: Railings for use with Metal Stairs.

1.3 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

B. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999, with Editorial Revision (2022).

C. ASTM A48/A48M - Standard Specification for Gray Iron Castings; 2022.

D. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

E. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.

F. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2023.

G. ASTM A510/A510M - Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel, and Alloy Steel; 2020.

H. ASTM A513/A513M - Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing; 2020a.

I. ASTM A563/A563M - Standard Specification for Carbon and Alloy Steel Nuts (Inch and Metric); 2021a.

J. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

K. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2020.

L. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2023, with Editorial Revision.

M. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.

N. ASTM B26/B26M - Standard Specification for Aluminum-Alloy Sand Castings; 2018, with Editorial Revision.

O. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

P. ASTM B455/B455M - Standard Specification for Copper-Zinc-Lead Alloy (Leaded-Brass) Extruded Shapes; 2020.

Q. ASTM B584 - Standard Specification for Copper Alloy Sand Castings for General Applications; 2022.

R. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2019.

S. ASTM D1187/D1187M - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal; 1997 (Reapproved 2018).

T. ASTM E488/E488M - Standard Test Methods for Strength of Anchors in Concrete Elements; 2022.

U. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs; 2022.

V. ASTM F594 - Standard Specification for Stainless Steel Nuts; 2022.

W. ASTM F1267 - Standard Specification for Metal, Expanded, Steel; 2018 (Reapproved 2023).

X. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength; 2020.

Y. ASTM F1941/F1941M - Standard Specification for Electrodeposited Coatings on Mechanical Fasteners, Inch and Metric; 2016.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer licensed in the State of Texas and experienced in the design of steel stairs and railings to design stairs and railings.

B. Structural Performance of Stairs:
   1. Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
      a. Uniform Load: 100 lbf/sq. ft.
      b. Concentrated load: 300 lbf applied on an area of four (4) square inches.
      c. Uniform and concentrated loads need not be assumed to act concurrently.
      d. Stair framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
      e. Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch, whichever is less.

C. Seismic Performance of Stairs:
   1. Metal stairs shall withstand the effects of earthquake motions:
      a. Component Importance Factor: 1.5.

D. ADA Compliance Guidelines:
   1. Treads, Riser, and Nosings:
      a. Interior stairs shall have the upper approach and lower tread marked by a stripe providing clear visual contrast. Exterior stairs shall have the upper approach and all treads marked by a stripe providing clear visual contrast.
      b. Stripe providing clear visual contrast shall be between 2 inches and 4 inches wide placed parallel to, and not more than 1 inch from the nose of the step or upper approach. The stripe shall extend the full width of the step or upper approach and shall be of material that is at least as slip resistant as the other treads of the stair. A painted stripe shall be acceptable. Grooves shall not be used to satisfy this requirement.
      c. Radius of curvature at the leading edge of the tread shall be no greater than 1/2 inch. Nosings that project beyond riser shall have the underside of the leading edge curved or beveled. The maximum angle for a rise to slope under the tread shall be 30 degrees from vertical. Nosings shall extend 1-1/4 inch maximum over the tread below.

d. Treads shall be 11 inches deep minimum. Risers shall be between 4 inches and 7 inches high. All steps on a flight of stairs shall have uniform riser heights and uniform tread depths. Open risers are not permitted.

1.5 SUBMITTALS

A. Product Data:
   1. Technical data for metal pan stairs and the following:
      a. Prefilled metal pan stair treads.
      b. Precast concrete treads.
      c. Epoxy resin filled stair treads.
      d. Nonslip aggregates and nonslip aggregate finishes.
      e. Abrasive nosings.
      f. Paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each type and finish of nosing and tread.

D. Delegated-Design Submittal: For stairs and railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

E. Welding Certificates.

F. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Welding qualifications:
      a. Qualify procedures and personnel according to the following:
         1) AWS D1.3/D1.3M Structural Welding Code - Sheet Steel.

B. Installer Qualifications: Fabricator of products, having minimum of five (5) years documented experience in the fabrication and installation of metal stairs.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Manufacturers listed whose products meet or exceed the specifications are approved for use in the Work. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.
   1. American Stair Corporation, Inc.; (800) 872-7824.
   2. Lapeyre Stair Inc.; (800) 535-7631.
   3. Pacific Stair Corporation; (888) 477-8247.
   4. Substitutions with Architect's approval, pursuant to conditions of Divisions 00 and 01.

B. Metal Surfaces: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

C. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

D. Steel Tubing: ASTM A500/A500M (cold formed) or ASTM A513/A513M.

E. Cast Iron: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.

F. Uncoated, Cold Rolled Steel Sheet: ASTM A1008/A1008M, structural steel, Grade 25 (Grade 170), unless another grade is required by design loads; exposed.

G. Uncoated, Hot Rolled Steel Sheet: ASTM A1011/A1011M, structural steel, Grade 30 (Grade 205), unless another grade is required by design loads.

H. Galvanized Steel Sheet: ASTM A653/A653M, G90 (Z275) coating, structural steel, Grade 33 (Grade 230), unless another grade is required by design loads.

I. Expanded Metal, Carbon Steel: ASTM F1267, Class 1 (uncoated).

J. Perforated Metal: Cold rolled steel sheet, ASTM A1008/A1008M, or hot rolled steel sheet, ASTM A1011/A1011M, commercial steel Type B.

K. Perforated Metal: Galvanized steel sheet, ASTM A653/A653M, G90 (Z275) coating, commercial steel Type B.

L. Woven Wire Mesh: Intermediate crimp, two-inch woven wire mesh, made from 0.135 inch nominal diameter wire complying with ASTM A510/A510M.

M. Aluminum Extrusions: ASTM B221, Alloy 6063-T6.

N. Aluminum Castings: ASTM B26/B26M, Alloy 443.0-F.

O. Bronze Extrusions: ASTM B455/B455M, Alloy UNS No. C38500 (extruded architectural bronze).

P. Bronze Castings: ASTM B584, Alloy UNS No. C83600 (leaded red brass) or No. C84400 (leaded semi-red brass).

Q. Nickel Silver Castings: ASTM B584, Alloy UNS No. C97600 (20 percent leaded nickel bronze).

R. Fasteners:
   1. Provide zinc plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required:
      a. Bolts and Nuts: Regular hexagon head bolts, ASTM A307, Grade A with hex nuts, ASTM A563/A563M and, where indicated, flat washers.
      b. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563/A563M and, where indicated, flat washers:
         1) Provide mechanically deposited or hot dip, zinc coated anchor bolts.
      c. Post Installed Anchors:
         1) Torque controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency:
            (a) Material for interior locations: Carbon steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
            (b) Material for exterior locations and where stainless steel is indicated: Alloy Group 1 (A1) stainless steel bolts, ASTM F593 and nuts, ASTM F594.

S. Miscellaneous Materials:
   1. Shop Primer for Ferrous Metal: Universal primer, organic zinc rich primer, complying with SSPC-Paint 20 and compatible with topcoat. Provide Series 10 Tnemec Primer by Tnemec.
   2. Universal Shop Primer: Fast curing, lead and chromate free, universal modified alkyd primer and compatible with topcoat. Use primer containing pigments that make it easily distinguishable from zinc rich primer.
   3. Water Based Primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel and compatible with topcoat.
   4. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc coated metal and compatible with finish paint systems indicated.
   5. Galvanizing Repair Paint: High zinc dust content paint for regalvanizing welds in steel, complying with SSPC-Paint 20. Provide Series 90-97 Tneme-Zinc by Tnemec.

6. Bituminous Paint: Cold applied asphalt emulsion complying with SSPC-Paint 12, containing no asbestos fibers, or cold applied asphalt emulsion complying with ASTM D1187/D1187M.
7. Concrete Materials and Properties: Comply with requirements in Section 03 30 00 - Cast-In-Place Concrete for normal weight, air entrained, ready mix concrete with a minimum 28-day compressive strength of 3,000 psi unless otherwise indicated.
8. Non-Slip Aggregate Concrete Finish: Factory packaged abrasive aggregate made from fused, aluminum oxide grits or crushed emery; rustproof and non-glazing; unaffected by freezing, moisture, or cleaning materials.
9. Welded Wire Reinforcement: 6 by 6 inches, W1.4 by W1.4, unless otherwise indicated.

2.2 FABRICATION

A. Provide complete stair assemblies, including metal framing, hangers, struts, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure:
   1. Join components by welding unless otherwise indicated.
   2. Use connections that maintain structural value of joined pieces.

B. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form bent metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

E. Form exposed work with accurate angles and surfaces and straight edges.

F. Weld connections to comply with the following:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. Weld exposed corners and seams continuously unless otherwise indicated.

G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.

2.3 FINISHES

A. Finish metal stairs after assembly.

B. Galvanizing:
   1. Hot dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products:
      a. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
      b. Fill vent and drain holes that are exposed in the finished work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

C. Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with SSPC-SP 3 Power Tool Cleaning.

D. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1 Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel for shop painting.

PART 3 - EXECUTION

3.1 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for metal stairs. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

C. Coordinate locations of hanger rods and struts with other work so that they do not encroach on required stair width and are within the fire-resistance rated stair enclosure.

3.2 INSTALLING METAL PAN STAIRS

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through bolts, lag bolts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.

C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.

D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

E. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot dip galvanized after fabrication and are for bolted or screwed field connections.

F. Place and finish concrete fill for treads and platforms to comply with Section 03 30 00 - Cast-In-Place Concrete. Install abrasive nosings with anchors fully embedded in concrete. Center nosings on tread width.

G. Install precast concrete treads with adhesive supplied by manufacturer.

3.3 ADJUSTING AND CLEANING

A. Touchup Painting:
   1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC PA1 for touching up shop painted surfaces:
      a. Apply by brush or spray to provide a minimum 2.0 mil dry film thickness.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 05 51 00

SECTION 05 52 00 - METAL RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:
   1. Aluminum pipe and tube railings.
   2. Stainless steel pipe and tube railings.
   3. Gates.
   4. Accessories necessary for a complete installation.

1.3 REFERENCE STANDARDS

A. 2012 TAS - Texas Accessibility Standards; 2012.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

C. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2020.

D. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2019.

E. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2020.

F. ASTM D1187/D1187M - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal; 1997 (Reapproved 2018).

G. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2021.

H. ASTM F1083 - Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures; 2018 (Reapproved 2022).

I. ASTM F1941/F1941M - Standard Specification for Electrodeposited Coatings on Mechanical Fasteners, Inch and Metric; 2016.

J. ASTM F2329/2329M - Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners; 2015.

K. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).

L. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2014, with Errata (2020).

M. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2018.

N. AWS D1.6/D1.6M - Structural Welding Code - Stainless Steel; 2017, with Amendment (2021).

1.4 SUBMITTALS

A. Product Data:
   1. Technical data for railings and the following:
      a. Manufacturer's product lines of mechanically connected railings.
      b. Railing brackets.
      c. Grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples:
   1. For each type of exposed finish required:

a. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
b. Fittings and brackets.
c. Assembled sample of railing system, made from full size components, including top rail, post, handrail, and infill. Sample need not be full height:
1) Show method of connecting and finishing members at intersections.

D. Delegated Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

E. Qualification Data: For testing agency.

F. Mill Certificates: Signed by manufacturers of stainless steel products certifying that products furnished comply with requirements.

G. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

H. Product Test Reports: For pipe and tube railings, for tests performed by a qualified testing agency, according to ASTM E894 and ASTM E935 .

I. Evaluation Reports: For post installed anchors, from ICC-ES.

1.5 PERFORMANCE REQUIREMENTS

A. Structural Performance:
1. Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
a. Handrails and Top Rails of Guards:
1) Uniform load of 50 lbf/ ft. applied in any direction.
2) Concentrated load of 200 lbf applied in any direction.
3) Uniform and concentrated loads need not be assumed to act concurrently.
2. Infill of Guards:
a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of one square foot (0.093 sq. m).
b. Infill load and other loads need not be assumed to act concurrently.

B. Thermal Movements:
1. Allow for thermal movements from ambient and surface temperature changes:
a. Temperature change: 120 degrees F, ambient; 180 degrees F .

1.6 QUALITY ASSURANCE

A. Regulatory Requirements:
1. Accessibility Requirements:
a. Texas Accessibility Standards, 2012 Edition (2012 TAS).
2. Welding qualifications: Qualify procedures and personnel according to the following:
a. AWS D1.1/D1.1M Structural Welding Code – Steel.
b. AWS D1.2/D1.2M Structural Welding Code - Aluminum.
c. AWS D1.3/D1.3M Structural Welding Code - Sheet Steel.
d. AWS D1.6/D1.6M Structural Welding Code - Stainless Steel.

B. Source Limitations: Obtain each type of railing from single source from single manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Manufacturers listed whose products meet or exceed the specifications are approved for use in the Work. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.
   1. Steel Pipe and Tube Railings:
      a. Industrial Metal Supply Co., 1-818-729-3333.

B. Metal Surfaces: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

C. Brackets, Flanges, and Anchors:
   1. Formed metal of same type of material and finish as supported rails unless otherwise indicated:
      a. Provide type of bracket with predrilled hole for exposed bolt anchorage and that provides 1-1/2 inch clearance from inside face of handrail to finished wall surface.

D. Fasteners:
   1. Ungalvanized Steel Railings: Plated steel fasteners complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5 for zinc coating.
   2. Hot Dip Galvanized Railings: Type 304 stainless steel or hot dip zinc coated steel fasteners complying with ASTM A153/A153M or ASTM F2329/2329M for zinc coating.
   3. Provide exposed fasteners with finish matching appearance, including color and texture of railings.
   4. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.
   5. Fasteners for Interconnecting Railing Components:
      a. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.
      b. Provide tamper resistant hex socket flat head machine screws for exposed fasteners unless otherwise indicated.

E. Miscellaneous Materials:
   1. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
   2. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
   3. Galvanizing Repair Paint: High zinc dust content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
   4. Shop Primer for Ferrous Metal: Universal primer, organic zinc rich primer, complying with SSPC-Paint 20 and compatible with topcoat. Provide 10-99 (red) or 10-09 (gray) by Tnemec Company.
   5. Universal Shop Primer: Fast curing, lead and chromate free, universal modified alkyd primer and compatible with topcoat. Use primer containing pigments that make it easily distinguishable from zinc rich primer.
   6. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc coated metal and compatible with finish paint systems indicated.
   7. Galvanizing Repair Paint: High zinc dust content paint for regalvanizing welds in steel, complying with SSPC-Paint 20. Provide Tneme-Zinc 90-97 by Tnemec Company.
   8. Bituminous paint: Cold applied asphalt emulsion complying with SSPC-Paint 12, containing no asbestos fibers, or cold applied asphalt emulsion complying with ASTM D1187/D1187M.
   9. Non-Shrink, Non-Metallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

10. Man Gates:
    a. 34 inch clearance, 10 inch galvanized kick plate with 3-1/2 inch bottom clearance to ground.
    b. Framing: Fabricate chain link swing gates in accordance with ASTM F900 using galvanized steel tubular members, two inches (2”) square, weighing 2.60 lb/ft. Fusion or stainless steel welded connections forming rigid one-piece unit.
    c. Gate Posts:
        1) Steel pipe, ASTM F1083, standard weight Schedule 40; minimum yield strength of 25,000 psi. Hot-dipped galvanized with minimum 1.8 oz/ft² of zinc. Width for single gate or one gate leaf of double gates:
            (a) 6 feet or less: 2.875 inches in diameter, weighing 5.79 lb/ft.
            (b) Over 6 feet to 12 feet: 4.00 inches in diameter, weighing 9.11 lb/ft.
            (c) Over 12 feet to 19 feet: 6.625 inches in diameter, weighing 18.97 lb/ft.
            (d) Over 19 feet to 23 feet: 8.625 inches in diameter, weighing 28.55 lb/ft.
    d. Man Gate Hardware Materials:
        1) Hot dipped galvanized steel or malleable iron shapes to suit gate size:
            (a) Hinges: Structurally capable of supporting gate leaf and allowing opening and closing without binding. Non-lift-off type hinge design shall permit gate to swing 180 degrees inward.
            (b) Latch: Spring slide latch capable of retaining gate in closed position with provision for padlock. Latch shall permit operation from either side of gate.
            (c) Drop Rod: Provide at double gates to hold inactive leaf. Provide gate stop pipe to engage center drop rod. Provide locking device and padlock eyes as an integral part of latch, requiring one (1) padlock for locking both gate leaves.

2.2 FABRICATION, GENERAL

A. Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that are exposed to weather in a manner that excludes water. Provide weep holes where water may accumulate.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with either welded or nonwelded connections unless otherwise indicated.

H. Welded Connections:
    1. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings:
    2. Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.

I. Non-Welded Connections:
    1. Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints:

a. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.

J. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

K. Exposed Ends: Close exposed ends of railing members with prefabricated end fittings.

L. Returns:
1. Provide wall returns at ends of wall mounted handrails unless otherwise indicated.

M. Brackets, Flanges, Fittings, and Anchors:
1. Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work. Furnish inserts and other anchorage devices for connecting to concrete or masonry work:
a. For galvanized railings, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous metal components.

N. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

O. For railing posts set in concrete, provide steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate forming bottom closure.

P. For removable railing posts, fabricate slip fit sockets from steel tube or pipe whose Interior Diameter is sized for a close fit with posts; limit movement of post without lateral load, measured at top, to not more than 1/40 of post height. Provide socket covers designed and fabricated to resist being dislodged.

Q. Toe Boards:
1. Where indicated, provide toe boards at railings around openings and at edge of open sided floors and platforms.
2. Fabricate to dimensions and details indicated.
3. Fabricate of same material as railings unless noted otherwise.

2.3 FABRICATION OF GATES

A. Gates: Form gates from steel tube of same size and shape as top rails, with infill to match guards. Provide with cam type, self-closing hinges for fastening to wall and overlapping stop with rubber bumper to prevent gate from opening in direction opposite egress.

2.4 FABRICATION OF STAINLESS STEEL RAILINGS

A. Connections shall be as indicated on Drawings.

B. Form Changes in Direction As detailed.

2.5 FINISHES

A. Steel and Iron Finishes: Stainless Steel.

PART 3 - EXECUTION

3.1 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacture’s written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

D. Coordinate with District on railings specific to animal control or livestock access.

3.2 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

B. Grade elevation review to actual conditions.

C. Coordinate elevation to specific use with livestock, large and small.

3.3 EXAMINATION

A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements are clearly marked for installer. Locate reinforcements and mark locations if not already done.

3.4 INSTALLATION

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack:
   1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
   2. Set posts plumb within a tolerance of 1/16 inch in three feet .
   3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet .

C. Control of Corrosion:
   1. Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials:
      a. Coat, with a heavy coat of bituminous paint, concealed surfaces of aluminum that are in contact with grout, concrete, masonry, wood, or dissimilar metals.

D. Adjust railing systems before anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated or, if not indicated, as required by design loads. Plumb posts in each direction. Secure posts and rail ends to building construction as follows:
   1. Anchor handrail ends to concrete and masonry with steel round flanges welded to rail ends and anchored with post-installed anchors and bolts.

E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.5 RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections whether welding is performed in the shop or in the field.

B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip joint internal sleeve extending two inches (50 mm) beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within six inches of post.

3.6 ANCHORING POSTS

A. Use metal sleeves preset and anchored into concrete for installing posts. After posts are inserted into sleeves, fill annular space between post and sleeve with non-shrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Form or core drill holes not less than 5 inches deep and 3/4 inch larger than outside diameter of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.

C. Cover anchorage joint with flange of same metal as post, welded to post after placing anchoring material.

D. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members:
   1. For aluminum pipe railings, attach posts using fittings designed and engineered for this purpose.
   2. For stainless steel pipe railings, weld flanges to post and bolt to supporting surfaces.
   3. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.

E. Install removable railing sections, where indicated, in slip fit metal sockets cast in concrete.

3.7 ATTACHING RAILINGS

A. Anchor railing ends at walls with round flanges anchored to wall construction and to railing ends using nonwelded connections.

B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and connected to railing ends using nonwelded connections.

C. Attach railings to wall with wall brackets, except where end flanges are used. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

D. Secure wall brackets and railing end flanges to building construction as follows:
   1. For concrete and solid masonry anchorage, use drilled in expansion shields and hanger or lag bolts.
   2. For wood stud partitions, use hanger or lag bolts set into studs or wood backing between studs. Coordinate with carpentry work to locate backing members.
   3. For steel framed partitions, use self-tapping screws fastened to steel framing or to concealed steel reinforcements.

3.8 ADJUSTING AND CLEANING

A. Touchup Painting:
   1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC PA1 requirements for touching up shop painted surfaces:
      a. Apply by brush or spray to provide a minimum 2.0 mil dry film thickness.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A780/A780M.

3.9 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION 05 52 00

SECTION 05 55 16 - METAL STAIR NOSINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Extruded aluminum finishing and edge-protection profiles for stair nosings
   2. Steel finishing and edge-protection profiles for stair nosings

B. Related Sections:
   1. Section 03 30 00 - Cast-In-Place Concrete.
   2. Section 06 10 00 - Rough Carpentry: Plywood subfloor and underlayment
   3. Section 07 92 00 - Joint Sealants.
   4. Section 09 21 16 - Gypsum Board Assemblies: Gypsum board and tile backer boards

1.3 REFERENCE STANDARDS

A. ANSI A108/A118/A136 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2019.

B. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2024.

1.4 REFERENCES

A. Tile Council of North America (TCNA (HB)) Handbook for Ceramic Tile Installation

B. Terrazzo, Tile and Marble Association of Canada (TTMAC) Specification Guide 09300 Tile Installation Manual

C. American National Standard Specifications for the Installation of Ceramic Tile ANSI A108/A118/A136.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Specifications are based on the products identified as Basis of Design. Manufacturers listed whose products meet or exceed the specifications are approved for use in the Work. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.
   1. Cast Metal Units:
      a. American Safety Tread Co., Inc.
      b. Barry Pattern & Foundry Co., Inc.
      c. Granite State Casting Co.
      d. Nystrom, Inc.
      e. Safe-T-Metal Company, Inc.
      f. Wooster Products Inc.
   2. Extruded Metal Units:
      a. ACL Industries, Inc.
      b. American Safety Tread Co., Inc.
      c. Amstep Products.
      d. Armstrong Products, Inc.
      e. Balco/Metalines.
      f. Granite State Casting Co.
      g. Nystrom, Inc.
      h. Pemko Manufacturing Co.
      i. Safe T Metal Co.

j. Schluter Systems, L.P.

3. Substitutions: Refer to Section - 01 25 00 - Subsitution Procedures.

2.2 STAIR NOSINGS

A. Cast Metal Units:

1. Description: Cast aluminum with an integral abrasive, as-cast finish consisting of aluminum oxide, silicon carbide, or a combination of both. Fabricate units in lengths necessary to accurately fit openings or conditions.
2. Configuration: Cross-hatched units, 3 inches wide without lip.

B. Extruded Metal Units:

1. Description: Extruded aluminum units with abrasive filler consisting of aluminum oxide, silicon carbide, or a combination of both in an epoxy resin binder. Fabricate units in lengths necessary to accurately fit openings or conditions.
2. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.
3. Apply bituminous paint to concealed surfaces of cast-metal units set into concrete.
4. Apply clear lacquer to concealed surfaces of extruded units set into concrete.
5. Aluminum Stair Nosing:
   a. Description: Two-component, 3-1/4 inch deep by 9/16 inch high aluminum stair nosing with ribbed abrasive strips.
   b. Basis of Design: Model DST-330 as manufactured by Balco.
   c. Finish: Mill Finished Aluminum with abrasive strips in color as selected by Architect.
6. Aluminum Stair Nosing:
   a. Description: 1-1/4 inch wide by 1-1/8 inch high nail-down style aluminum stair nosing.
   b. Basis of Design: Model 2120 as manufactured by Pemco.
   c. Finish: As selected by Architect.
7. Aluminum Stair Nosing:
   a. Description: anodized aluminum profile with symmetrically-rounded top surface with 1/4 inch radius and vertical leg that together form the exposed surface, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.
   b. Basis of Design: Schluter®-RONDEC-STEP.
   c. Corners: AS indicated on Drawings.
   d. Finish: ACGB - Brushed Chrome Anodized Aluminum.
   e. Vertical Leg Length: As required.
   f. Height: As required.
8. Composite Stair Nosing:
   a. Description: Roll-formed stainless steel profile with ribbed, 1-3/16 inch wide exposed surface with rounded leading edge and integrated trapezoid-perforated anchoring leg.
   b. Basis of Design: Schluter®-TREP-E.
   c. Material and Finish: E - Stainless Steel Type 304 = V2A.
   d. End Caps: Provide matching end caps.
   e. Height: As required.
9. Composite Stair Nosing:
   a. Description: Roll-formed stainless steel profile with ribbed, 1-5/16 inch wide exposed surface with rounded leading edge for surface attachment to stair tread.
   b. Basis of Design: Schluter®-TREP-EK.
   c. Material and Finish: E - Stainless Steel Type 304 = V2A.
   d. Height: As required.
   e. Description: Roll-formed stainless steel profile with ribbed, 1-3/16 inch wide exposed surface with rounded leading edge for surface attachment to stair tread.
   f. Basis of Design: Schluter®-TREP-G-S.
   g. Material and Finish: E - Stainless Steel Type 304 = V2A.
   h. Height: As required.

i. Abrasive Strip Color:

10. Composite Stair Nosing:
    a. Description: Roll-formed stainless steel profile with ribbed, 2-5/32 inch wide exposed surface with rounded leading edge for surface attachment to stair tread.
    b. Basis of Design: Schluter®-TREP-G-B.
    c. Material and Finish: E - Stainless Steel Type 304 = V2A.
    d. Height: As required.
    e. Abrasive Strip Color:
11. Composite Stair Nosing:
    a. Description: Profile with replaceable, ribbed, 1-1/32" wide, thermoplastic rubber exposed surface with rounded leading edge, and roll-formed stainless steel type 304 = V2A support section with integrated trapezoid-perforated anchoring leg.
    b. Basis of Design: Schluter®-TREP-SE.
    c. Material and Finish: Thermoplastic tread with Stainless Steel Type 304 = V2A support.
    d. Height: As required.
    e. Tread Color: CG – Yellow.
12. Composite Stair Nosing:
    a. Description: Profile with replaceable, ribbed, 1-1/32 inch wide, thermoplastic rubber exposed surface with rounded leading edge and extruded aluminum support section with integrated trapezoid-perforated anchoring leg.
    b. Basis of Design: Schluter®-TREP-S.
    c. Material and Finish: Thermoplastic tread with aluminum support.
    d. Height: As required.
    e. Tread Color: CG – Yellow.
13. Composite Stair Nosing:
    a. Description: Profile with replaceable, ribbed, 1-1/32 inch wide, thermoplastic rubber exposed surface with rounded leading edge and extruded aluminum support section with integrated trapezoid-perforated anchoring leg.
    b. Basis of Design: Schluter®-TREP-B.
    c. Material and Finish: Thermoplastic tread with aluminum support.
    d. Height: As required.
    e. Tread Color: CG – Yellow.
14. Composite Stair Nosing:
    a. Description: profile, with 11/32 inch wide, 13/16 inch tall, exposed surface with rounded leading edge and integrated trapezoid-perforated anchoring leg.
    b. Basis of Design: Schluter®-TREP-FL.
    c. Material and Finish: E - Stainless Steel Type 304 = V2A.
    d. Height: As required.
    e. End Caps: Provide matching end caps.
15. Composite Stair Nosing for Metal Pan Stairs:
    a. Description: Extruded 6063-T-6 aluminum profile, 3 inch wide with 1-3/8 inch lip and 3/4 inch integrated extruded anchor.
    b. Basis of Design: Model 8511 manufactured by American Safety Tread.
    c. Material and Finish: Mill finish aluminum.
    d. Abrasive:
        1) Material: Aluminum oxide and silicon carbide in epoxy binder.
        2) Color: Black.
16. Composite Anti-Slip Safety Strip for Concrete Stairs:
    a. Description: Extruded aluminum profile, 2 inch wide with contrasting abrasive anti-slip strip to be installed 1 inch from the nose edge of the tread in poured concrete stairs.
    b. Basis of Design: Model as manufactured by American Safety Tread.

c. Material and Finish: AE - Satin Anodized Aluminum.

PART 3 EXECUTION

3.1 APPLICATION

A. Install in accordance with Manufacturer's recommendations.

B. Install where indicated on Drawings.

END OF SECTION 05 55 16

SECTION 05 58 13 - COLUMN COVERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes snap-together metal column covers. Sizes and styles indicated on Drawings.

B. Related Sections:
   1. Section 05 50 00 - Metal Fabrications.

1.3 SUBMITTALS

A. Product Data: For each type of product, including finishing materials.

B. Shop Drawings:
   1. Show fabrication and installation details for column covers:
      a. Include details showing attachment to support structure.
      b. Indicate materials, sizes, thickness, fastenings, and profiles. Show details of weatherproofing at edges, termination, penetrations, and connections to adjacent materials.

C. Samples for Initial Selection: For products involving selection of color, texture, or design, including mechanical finishes.

D. Samples for Verification: For each type of exposed finish required, prepared on 6 inch square samples of metal of same thickness and material indicated for the Work.

E. Exterior Product Approvals:
   1. Manufacturer shall certify that product complies with and has been tested and approved in compliance with Florida Product Approval or Miami Dade NOA and applicable requirements.
   2. Manufacturer shall certify that product complies with large [and small] missile impact criteria and has been tested and approved in compliance with Florida Product Approval or Miami Dade NOA and applicable requirements.

F. Qualification Data: For firms and persons specified in “Quality Assurance” Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architect and owners, and other information specified.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm experienced in producing column covers similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

B. Installer Qualifications: Installer shall be the fabricator or an experienced firm acceptable to the fabricator for installation of the products specified.

C. Mockups:
   1. Build mockups to verify selections made under sample submittals, to demonstrate aesthetic effects and to set quality standards for fabrication and installation:
      a. Build mockups of typical column covers.
      b. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver column covers wrapped in protective coverings and strapped together in suitable packs or in heavy-duty cartons. Remove protective coverings before they stain or bond to finished surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Specifications are based on products of manufacturers named as the Basis of Design. Manufacturers listed whose products meet or exceed the specifications are approved for use on the Project. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.
   1. Pac-Clad.
   2. Substitutions with Architect's approval, pursuant to conditions of Divisions 00 and 01.

2.2 SNAP-TOGETHER COLUMN COVERS

A. Form column covers to shapes indicated from metal of type and minimum thickness indicated below. Return vertical edges and bend to form hook that engages continuous mounting clips:
   1. Basis of Design: PAC-1000F Column Cover as manufactured by Pac=Clad
   2. Aluminum sheet - ASTM B209, with not less than strength and durability properties of Alloy 5005-H32, 0.125 inch thick:
      a. Finish: Clear anodic.
   3. Column covers may be fabricated from prefinished metal sheet in lieu of finishing after fabrication provided unfinished edges are concealed from view.
   4. Increase metal thickness or reinforce with concealed stiffeners, backing materials, or both, as needed to provide flat surfaces where indicated.
   5. Support joints with concealed stiffeners as needed to hold exposed faces of adjoining sheets in flush alignment.
   6. Form returns at vertical joints to provide hairline V-joints.
   7. Fabricate column covers without horizontal joints.
   8. Fabricate column covers with horizontal butt joints, tightly fitted and backed with a sleeve for field splicing with adhesive.
   9. Fabricate base and ceiling ring to match column covers.
   10. Apply manufacturer's recommended sound-deadening mastic to backs of column covers.

2.3 MISCELLANEOUS MATERIALS

A. Fasteners:
   1. Fabricated from same basic metal and alloy as fastened metal unless otherwise indicated. Do not use metals that are incompatible with materials joined:
      a. Provide concealed fasteners for interconnecting column covers and for attaching them to other work unless exposed fasteners are unavoidable or are the standard fastening method.
      b. Provide square or hex socket flat head machine screws for exposed fasteners unless otherwise indicated.

B. Sound-Deadening Materials:
   1. Mastic:
      a. Cold applied asphalt emulsion complying with ASTM D1187/D1187M.

C. Backing Materials: Provided or recommended by column cover manufacturer.

D. Bituminous Paint: Cold applied asphalt emulsion complying with ASTM D1187/D1187M.

2.4 FABRICATION

A. Coordinate dimensions and attachment methods of column covers with those of adjoining construction to produce integrated assemblies with closely fitting joints and with edges and surfaces aligned unless otherwise indicated.

B. Form metal to profiles indicated, in maximum lengths to minimize joints. Produce flat, flush surfaces without cracking or grain separation at bends.

2.5 FINISH

A. General Requirements:
   1. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
   2. Apply organic and anodic finishes to formed metal after fabrication unless otherwise indicated.
   3. Appearance of finished work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within 1/2 of the range of approved samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved samples and are assembled or installed to minimize contrast.

B. Aluminum Finishes:
   1. Clear anodic finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of column covers.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Locate and place column covers plumb and in alignment with adjacent construction. Perform cutting, drilling, and fitting required to install column covers:
   1. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.

B. Use concealed anchorages where possible.

C. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealants and joint fillers as indicated.

D. Corrosion Protection: Apply bituminous paint or other permanent separation materials on concealed surfaces where metals would otherwise be in direct contact with substrate materials that are incompatible or could result in corrosion or deterioration of either material or finish.

3.3 PROTECTION

A. Protect finishes from damage during construction period. Remove temporary protective coverings at time of Substantial Completion.

END OF SECTION 05 58 13

SECTION 05 75 00 - DECORATIVE FORMED METAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Edge-protection and transition profiles for floors.
   2. Finishing and edge-protection profiles for walls and countertops.
   3. Decorative corner trim.
   4. Mirror trim.

1.3 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.

B. ASTM B26/B26M - Standard Specification for Aluminum-Alloy Sand Castings; 2018, with Editorial Revision.

C. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

D. ASTM B210/B210M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes; 2019a.

E. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

F. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

G. ASTM B247 - Standard Specification for Aluminum and Aluminum-Alloy Die Forgings, Hand Forgings, and Rolled Ring Forgings; 2020.

H. ASTM B247M - Standard Specification for Aluminum and Aluminum-Alloy Die Forgings, Hand Forgings, and Rolled Ring Forgings (Metric); 2020.

I. ASTM B429/B429M - Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube; 2020.

1.4 SUBMITTALS

A. Refer to Section 01 33 00 - Submittal Procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
   4. Warranty.

C. Verification Samples: For each finish product specified, minimum size 6 inches square, representing actual product in color and texture.

D. Exterior Product Approvals:
   1. Manufacturer shall certify that product complies with and has been tested and approved in compliance with Florida Product Approval or Miami Dade NOA and applicable requirements.
   2. Manufacturer shall certify that product complies with large [and small] missile impact criteria and has been tested and approved in compliance with Florida Product Approval or Miami Dade NOA and applicable requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in manufacturer's original, unopened, undamaged containers with identification labels intact.
   1. Package for protection against transportation damage.
   2. Provide markings to identify components consistently with drawings.

B. Store products protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
   1. Store in well-ventilated space out of direct sunlight.
   2. Protect from moisture and condensation.
   3. Avoid contact with other materials that might cause staining, denting, or other surface damage.

1.6 WARRANTY

A. Refer to Section 01 77 00 - Closeout Procedures and Checklist for additional warranty requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
   1. C.R. Laurence Co., Inc.: www.crlaurence.com.
   2. Fry Reglet Corporation: www.fryreglet.com.
   3. Genesis APS International: www.genesis-gs.com.
   4. Schluter Systems: www.schluter.com.

B. Substitutions: Refer to Section - 01 25 00 - Substitution Procedures.
   1. Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution.

2.2 EDGE-PROTECTION AND TRANSITION PROFILES FOR FLOORS

A. Flooring Transition, Type Ramp Transition (MT-1):
   1. Basis of Design Product: RENO-RAMP manufactured by Schluter.
   2. Description: anodized aluminum profile with textured, sloped exposed surface, tapered leading edge, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.
   3. Material and Finish: AE - Satin Anodized Aluminum.
   4. Height: Height as required.
   5. Ramp Length: As required to maintain a slope not greater than one unit vertically in two units horizontally.

B. Flooring Transition, Type Existing Same- Height Transitions (MT-2):
   1. Basis of Design Product: RENO-T manufactured by Schluter.
   2. Description: T-shaped profile with 1/16 inch thick beveled exposed surface and 11/32 inch tall integrated vertical anchoring leg.
   3. Material and Finish: AE - Satin Anodized Aluminum.
   4. Width: 17/32 inch.

C. Flooring Transition, Type Tile-to-Carpet (MT-3):
   1. Basis of Design Product: RENO-TK manufactured by Schluter.
   2. Description: profile with sloped exposed surface, 1/4" deep channel below exposed surface, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.
   3. Anchoring Leg: Provide with straight or special radius anchoring leg, as required.
   4. Material and Finish:AE - Satin Anodized Aluminum.
   5. Height: Height as required.

D. Flooring Transition, Type Tile to Flooring with Adjustable Transition (MT-5):
   1. Basis of Design Product: RENO-V manufactured by Schluter.
   2. Description: ball-and-socket hinged profile with sloped exposed surface, tapered leading edge, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.
   3. Material and Finish: AE - Satin Anodized Aluminum.
   4. Height: Height as required.
   5. Ramp Length: As required to maintain a slope not greater than on unit vertically in two units horizontally.

E. Flooring Transition, Type Tiled Floor to Wall Cover (MT-6):
   1. Basis of Design Product: DILEX-AHK manufactured by Schluter.
   2. Description: Cove-shaped profile with single anchoring leg for anchoring into floor mortar.
   3. Material and Finish: AE - Satin Anodized Aluminum.
   4. Height: Height as required.
   5. Radius: 3/8 inch.

F. Flooring Transition, Type Tiled Wall to Finished Floor Cove (MT-7):
   1. Basis of Design Product: DILEX-AHKA manufactured by Schluter.
   2. Description: Cove-shaped profile for transitions between walls to be tiled and previously finished floors.
   3. Material and Finish: ACGB – Brushed Chrome Anodized Aluminum.
   4. Height: Height as required.
   5. Ramp Length: As required to maintain a slope not greater than one unit vertically in two units horizontally.

2.3 FINISHING AND EDGE-PROTECTION PROFILES FOR WALLS AND COUNTERTOPS

A. Decorative Trim, (ST-1):
   1. Basis of Design Product: JOLLY manufactured by Schluter.
   2. Description: L-shaped profile with 1/8-inch-wide top section and vertical wall section that together form the visible surface, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.
   3. Anchoring Leg: Provide with straight or special radius anchoring leg as required.
   4. Material and Finish: ACG - Polished Chrome Anodized Aluminum.
   5. Height: Height as required.

2.4 DECORATIVE CORNER TRIM

A. Corner Trim, Type (CT-1):
   1. Basis of Design Product: Fry Reglet®-DMCT-375.
   2. Description: Corner trim with 3/8” exposure on each side.
   3. Material and Finish: Mill.

2.5 MIRROR TRIM

A. General Requirements:
   1. Corners:
      a. Frames that are continuous around corners shall be mitered at four-sided frames or 90 degrees when n.
      b. Frames that are not continuous around corners shall be cut as indicated on Drawings or as selected by the Architect.
   2. Depth: As needed to accommodate mirror and required shims, gaskets, and other accessories.
   3. Length: As indicated on Drawings.

2.6 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
   1. Sheet and Plate: ASTM B209/B209M.

2. Extruded Bars, Rods, Profiles, and Tubes:ASTM B221/ASTM B221M , Alloy 6063-T5/T52.
3. Extruded Structural Pipe and Tubes: ASTM B429/B429M, Alloy 6063-T6.
4. Drawn Seamless Tubing: ASTM B210/B210M, Alloy 6063-T832.
5. Plate and Sheet: ASTM B209/B209M, Alloy 6061-T6.
6. Die and Hand Forgings: ASTM B247/ASTM B247M, Alloy 6061-T6.
7. Castings: ASTM B26/B26M, Alloy A356.0-T6.

B. Factory Finish:
1. Clear Anodic Coating: AA-M12C22A41, AAMA 611, Architectural Class I Clear Anodic Coating.

PART 3 - EXECUTION

3.1 APPLICATION

A. Consult manufacturer’s current technical literature for proper design and installation instructions.

END OF SECTION 05 75 00

SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes rough carpentry, light hardware, and miscellaneous items of work not included in another Section. This Section also includes:
   1. Structural wood supports, grounds, backing, and blocking required for millwork and casework items that are an integral part of wall, floor, and/or ceiling construction.
   2. Plywood sheathing.

B. Related Sections:
   1. Section 03 10 00 - Concrete Forming and Accessories.
   2. Section 07 21 00 - Thermal Insulation.
   3. Section 07 92 00 - Joint Sealants.
   4. Section 09 21 16 - Gypsum Board Assemblies.
   5. Section 10 28 00 - Toilet, Bath, and Laundry Accessories.

1.3 REFERENCE STANDARDS

A. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.

B. WCLIB (GR) - Standard Grading Rules for West Coast Lumber No. 17; 2018.

1.4 REFERENCES

A. Chapter 69A-58 F.A.C. - Uniform Fire Safety Standards for Educational Facilities

1.5 QUALITY ASSURANCE

A. Lumber and plywood shall be grade or quality marked by WWPA, WCLIB, APA, AWPB, or by other grading and inspection agencies acceptable to Architect. Grade marks shall include the designation "S-DRY"(or "MC-15" as applies) where applicable. Grade and quality marks shall not be apparent on surfaces exposed in the finished work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store kiln dried materials in enclosed areas, protected from moisture and separated from contact with concrete or soil.

PART 2 PRODUCTS

2.1 MATERIALS

A. Temporary Construction: Clean lumber at Contractor's option, rough or smooth, as usage requires.

B. Lumber Not Otherwise Specified or Noted:
   1. Douglas fir or larch, graded and grademarked, according to Reference Standard 1.02 A or B, #1 grade:
      a. Boards: Construction grade.
   2. Fire Retardant No. 2 S4S Southern Pine. Refer to Fire Retardant Treatment below. Use for framing, plates and blocking in all walls and partitions where required by building code or noted on Drawings.

C. Plywood for Walls and Roofs; as Indicated on Drawings:
   1. Unless glue type is otherwise specified, exterior plywood, interior plywood exposed to continuing moisture, and pressure treated plywood shall be fabricated with exterior glue. Plywood with interior glue shall be fully protected from soaking or continuing moisture at all times.

2. Fire Retardent Treated Playwood: Refer to Fire Retardant Treatment below. Use when required by Building code or noted on Drawings.

D. Rough Hardware:
   1. Nails, spikes, bolts, screws, tacks, and framing connectors of standard manufacture as required. Hot dip galvanize items exposed to moisture or to exterior and those items that are in contact with wood pressure treated with waterborne salts:
      a. Bolts and Nuts: ASTM A307, Grade A.
      b. Lag Bolts: Fed. Spec. FF-B-561.
      c. Nails: Fed. Spec. FF-N-101, common unless otherwise noted or specified.
      d. Joist Hangers and Framing Connectors: Simpson or approved equal, unless otherwise noted.
      e. Power Driven Fasteners: Hilti, Ramset, or approved equal, each use and fastener type subject to prior approval of Architect.

E. Pressure Treatment (Decay and Termite Prevention):
   1. Pressure treat for decay and termite prevention, Douglas fir or larch wood materials that are embedded in or set against concrete.
   2. Treat in accordance with Reference Standard 1.02 E and quality mark as per Reference Standard 1.02 F.
   3. Treat with any of the following processes at Contractor option. Creosote type preservatives are not permitted:
      a. Penta in an LPG carrier (Cellon) or Penta in Hydrocarbon Solvent-Type D (Dow Process) AWPB LP-4 quality marked.
      b. Ammoniacal copper arsenate (ACA) or chromated copper arsenate (CCA) in a water carrier (AWPB LP-2 quality marked).
      c. Disodium Octaborate Tetrahydrate (DOT) such as Advance Guard/Hi-bor by Osmose, Inc.
      d. Members treated with waterborne salts shall be dried to a moisture content not exceeding 19 percent after treatment.
   4. Where possible, precut material before treatment.
   5. Holes and cutoffs and handling and storage shall be in accordance with AWPA M-4.
   6. Ensure that ferrous metal fastenings and items in contact with wood treated with waterborne salts are hot dip galvanized (1.25 oz. coating) where required by ICC reports.

F. Framing Connectors: Simpson Strong Tie Corp., or equal.

G. Fire Retardant Treatment:
   1. Lumber shall be pressure-impregnated with non-combustible fire retardant chemicals in accordance with U.L. FRS Fire Hazard Classification. All lumber must be dried following treatment in accordance with AWPA Standard C20.
   2. Plywood shall be pressure-impregnated with non-combustible fire retardant chemcials in accordance with U.L. FRS Fire Hazard Classification. All plywood must be dried following treatment in accordance with AWPA Standards C27.

3.1 MOISTURE CONTENT

A. 19 percent maximum for two times thickness and less; 19 percent maximum for thickness greater than two times and less than four times; and 22 percent maximum for thickness greater than four times.

3.2 SIZES

A. Surfaced to "DRY" sizes. Sizes noted are nominal unless shown as net.

3.3 SURFACING

A. All wood materials exposed in the finished work shall have re-sawn surfaces of clean natural color unless noted or specified otherwise. Concealed framing lumber shall be S4S.

PART 3 EXECUTION

4.1 ERECTION AND INSTALLATION

A. Framing:
   1. Properly lay out framing with pieces closely fitted, accurately plumbed, leveled and aligned, and rigidly secured in place.
   2. All interior wood blocking shall be fire resistant.
   3. All interior wood blocking shall be exterior grade fire resistant.

B. Bridging and Blocking:
   1. Provide two times blocking at intersections of finished surfaces for adequate bearing and at points where required to support fixtures, cabinets, hardware, and other equipment mounted on walls.

C. Plywood (General): Unless more stringent requirements are indicated on the Drawings or required by code, application of plywood shall be in accordance with recommendations of the American Plywood Association.

D. Connections and Fastenings:
   1. For bolted connections, provide washers under heads and nuts bearing on wood, and draw nuts tight. Retighten before closing in framing.
   2. Exercise care in nailing through exposed sheathing and siding and ensure that fasteners penetrate into framing members

END OF SECTION 06 10 00

SECTION 06 16 00 - SHEATHING

PART 1 -GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:
   1. Wall sheathing.
   2. Underlayment.
   3. Sheathing joint and penetration treatment.
   4. Accessories necessary for a complete installation.

B. Related Sections:

1.3 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

B. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus; 2019.

C. ASTM C209 - Standard Test Methods for Cellulosic Fiber Insulating Board; 2020.

D. ASTM C834 - Standard Specification for Latex Sealants; 2017.

E. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2020.

F. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2017.

G. ASTM D1037 - Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials; 2012 (Reapproved 2020).

H. ASTM D2898 - Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing; 2010 (Reapproved 2017).

I. ASTM D3498 - Standard Specification for Adhesives for Field-Gluing Wood Structural Panels (Plywood or Oriented Strand Board) to Wood Based Floor System Framing; 2019a.

J. ASTM D5516 - Standard Test Method for Evaluating the Flexural Properties of Fire-Retardant Treated Softwood Plywood Exposed to Elevated Temperatures; 2018.

K. ASTM D6305 - Standard Practice for Calculating Bending Strength Design Adjustment Factors for Fire-Retardant-Treated Plywood Roof Sheathing; 2021.

L. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

M. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.

N. ASTM F1667/F1667M - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples; 2021a.

O. AWPA U1 - Use Category System: User Specification for Treated Wood; 2018.

1.4 SUBMITTALS

A. Product Data:
   1. Technical data for each type of process and factory fabricated product. Indicate component materials and dimensions and include construction and application details:

a. Include data for wood preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
b. Include data for fire retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
c. For fire retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5516.
d. For products receiving a waterborne treatment, include statement that moisture content of treated materials reduced to levels specified before shipment to Project site.
e. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.5 QUALITY ASSURANCE

A. Fire Test Response Characteristics:
1. For assemblies with fire resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E119 by a testing and inspecting agency acceptable to authorities having jurisdiction:
a. Fire resistance ratings: Indicated by design designations from UL Fire Resistance Directory or GA-600 Fire Resistance Design Manual.

B. Testing Agency Qualifications: For testing agency providing classification marking for fire retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Plywood: DOC PS 1.

B. Oriented Strand Board: DOC PS 2.

C. Thickness: As necessary to comply with requirements specified, but not less than thickness indicated.

D. Factory mark panels to indicate compliance with applicable standard.

2.2 PRESERVATIVE TREATED PLYWOOD

A. Preservative Treatment by Pressure Process - AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground:
1. Preservative chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

C. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

2.3 FIRE RETARDANT TREATED PLYWOOD

A. Where fire retardant treated materials are indicated, use materials complying with requirements acceptable to authorities having jurisdiction and with fire test response characteristics specified determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire Retardant Treated Plywood by Pressure Process:
   1. Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test:
      a. Use treatment that does not promote corrosion of metal fasteners.
      b. Exterior type: Treated materials shall comply with requirements specified above for fire retardant treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
      c. Design value adjustment factors: Treated lumber plywood shall be tested according to ASTM D5516 and design value adjustment factors shall be calculated according to ASTM D6305. Span ratings after treatment shall be not less than span ratings specified. For roof sheathing and where high temperature fire retardant treatment is indicated, span ratings for temperatures up to 170 degrees F shall be not less than span ratings specified.

C. Kiln dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.

D. Identify fire retardant treated plywood with appropriate classification marking of qualified testing agency.

E. Application:
   1. Treat plywood indicated on Drawings and the following:
      a. Roof and wall sheathing within 48 inches of fire walls.
      b. Subflooring and underlayment for raised platforms.

2.4 WALL SHEATHING

A. Glass Mat Gypsum Wall Sheathing - ASTM C1177/C1177M:
   1. Subject to compliance with requirements; provide products by one of the following:
      a. CertainTeed Corporation: GlasRoc (basis of design).
      b. Georgia Pacific: Dens-Glass.
      c. National Gypsum Company: Gold Bond eXP.
      d. United States Gypsum Co.: Securock.
   2. Type and Thickness: Regular, 1/2 inch thick.
   3. Size: Four feet by eight feet for vertical installation.

2.5 SUBFLOORING AND UNDERLAYMENT

A. Plywood Combination Subfloor Underlayment: DOC PS 1, Exterior, Structural I, C-C Plugged Single Floor Panels:
   1. Span rating: Not less than 20 o.c.
   2. Nominal thickness: Not less than one inch.
   3. Edge detail: Tongue and groove.
   4. Surface finish: Fully sanded face.

B. Underlayment: Provide underlayment in nominal thickness not less than 1/4 inch over smooth subfloors and not less than 3/8 inch over board or uneven subfloors.

C. Sound Deadening Board: Class C Fire Rated, Molded, Recycled Post-Consumer Paper, Cellulose Fiber Structural Panel:
   1. Density: 26 pcf to 28 pcf tested in accordance with ASTM C209.
   2. Tensile strength when tested in accordance with ASTM C209:

a. Parallel: 450 to 700 psi .
b. Transverse: 750 to 1,000 psi .

3. Hardness (Janka Ball): 230 pounds () tested in accordance with ASTM D1037.
4. Water absorption by volume, when tested in accordance with ASTM C209:
   a. Two-hour immersion: Maximum seven percent (7%).
5. Expansion: 50 percent to 90 percent relative humidity, 0.25 percent in accordance with ASTM C209.
6. Noise reduction coefficient (NCR): 0.20.
7. Flame spread: Maximum 75 tested in accordance with ASTM E84 Class C.
8. Thickness: 3/4 inch .

2.6 FASTENERS

A. Provide fasteners of size and type indicated that comply with requirements specified for material and manufacture. Provide fasteners with hot dip zinc coating complying with ASTM A153/A153M.

B. Nails, Brads, and Staples: ASTM F1667/F1667M.

C. Power Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Screws for Fastening Gypsum Sheathing to Cold Formed Metal Framing:
   1. Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic polymer or corrosion protective coating having salt spray resistance of more than 800 hours according to ASTM B117:
      a. For steel framing less than 0.0329 inch thick, use screws that comply with ASTM C1002.

2.7 SHEATHING JOINT AND PENETRATION TREATMENT MATERIALS

A. Sealant for Glass Mat Gypsum Sheathing:
   1. Silicone emulsion sealant complying with ASTM C834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass fiber sheathing tape and for covering exposed fasteners:
      a. Sheathing tape: Self-adhering glass fiber tape, minimum two inches wide, ten by ten or ten by 20 threads/inch, of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass mat gypsum sheathing and with history of successful in-service use.

2.8 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to Framing: Formulation complying with ASTM D3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

PART 3 -EXECUTION

3.1 INSTALLATION

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three (3) support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated.

D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.

E. Coordinate wall and roof sheathing installation with flashing and joint sealant installation so materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 GYPSUM SHEATHING INSTALLATION

A. Comply with GA-253 and with manufacturer's written instructions. Fasten gypsum sheathing to cold formed metal framing with screws. Install boards with a 3/8 inch (ap where non-load bearing construction abuts structural elements. Install boards with a 1/4 inch gap where they abut masonry or similar materials that retain moisture, to prevent wicking.

B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.

C. Vertical Installation:
   1. Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud:
      a. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.

D. Seal sheathing joints according to sheathing manufacturer's written instructions. Apply glass fiber sheathing tape to glass mat gypsum sheathing joints and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal penetrations and openings.

END OF SECTION 06 16 00

SECTION 06 20 00 - FINISH CARPENTRY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Providing all finish carpentry items including, but not limited to:
      a. Finish carpentry.
      b. Millwork and cabinetry.
      c. Plastic laminate.
      d. Casework hardware.
      e. Miscellaneous millwork.
   2. Installation of:
      a. Finish hardware.
      b. Plastic laminate faced wood doors.

B. Related Sections:
   1. Section 06 10 00 - Rough Carpentry.

1.3 REFERENCE STANDARDS

A. ANSI A208.1 - American National Standard for Particleboard; 2022.

B. ANSI A208.2 - Medium Density Fiberboard (MDF) for Interior Applications; 2016.

C. BHMA A156.9 - Cabinet Hardware; 2020.

1.4 SUBMITTALS

A. Product Data:
   1. Manufacturer's specifications and other data needed to prove compliance with specified requirements.
   2. Manufacturer’s preprinted product information for all hardware proposed on the Project.
   3. Manufacturer’s preprinted maintenance instructions for the casework hardware.

B. Shop Drawings:
   1. Indicate size, material, and finish.
   2. Show locations and installation procedures, including hardware, sinks, service fixtures, trim, and other pertinent data for each unit.

C. Certification: Provide manufacturer’s certification that casework has been fabricated and installed according to WI “Custom” Grade guidelines or better.

D. Samples: Two (2) each, 6 inch by 6 inch by 3/4 inch sample of specified particleboard core with grade stamp for use as verification of installed product.

E. Closeout:
   1. Record drawings: Indicate revisions to original Drawings and shop drawings.
   2. Manufacturer contact names, addresses, and phone numbers.
   3. Finish material schedule: Names and color numbers of laminates and stains.
   4. Keys: Provide additional master key for each room and additional locksets totaling one percent (1%) of total Project for attic stock.

1.5 PERFORMANCE REQUIREMENTS

A. Unless otherwise indicated, perform work in accordance with WI “Architectural Woodwork Standards,” Custom Grade, except where specification exceeds those standards the more stringent shall govern.

B. Fabricate millwork and cabinetry in accordance with ANSI A161.1, NEMA LD3, and general static load testing performed and certified by an independent testing agency covering the following areas of product performance, with these minimum results:
   1. Base cabinet construction/racking test: 800 pounds.
   2. Cabinet front joint loading test: 425 pounds.
   3. Wall cabinet static load test: 2,000 pounds.
   4. Drawer front joint loading test: 600 pounds.
   5. Drawer construction/static load test: 750 pounds.
   6. Cabinet adjustable shelf support device/static load test: 300 pounds.

C. Shelf Loading: Comply with loading/deflection standards of the Composite Panel Association.

1.6 QUALITY ASSURANCE

A. Manufacturers and fabricators must be Woodwork Institute listed Accredited Millwork Companies, current roster.

B. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a licensee of WI's Certified Compliance Program.

C. Installer Qualifications: Licensee of WI's Certified Compliance Program.

D. Quality Standard:
   1. Unless otherwise indicated, comply with WI's "Manual of Millwork" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements:
      a. Before delivery to jobsite, millwork supplier:
         1) Licensees of WI shall issue a certified compliance certificate indicating millwork products being furnished for this Project, and certifying that these products and their installation, will fully meet requirements of grade or grades specified.
         2) Non-licensees of WI shall provide evidence that they have arranged for inspection by WI inspector after completion of fabrication and installation. If conditions are found to be compliant, inspector will issue Compliance Certificate indicating millwork products being furnished for this Project and certifying that these products and their installation will fully meet requirements of grade or grades specified.
      b. Each elevation of casework and each countertop shall bear certified compliance label.
      c. Cabinet Design Series (CDS): CDS numbers on Drawings indicate typical designs.

E. Certified Seismic Installation Program (CSIP):
   1. Before wood or metal stud walls are closed up, provide a written Woodwork Institute CSIP report confirming that acceptable backing is provided in all locations required for casework installation or identifying those locations where backing is missing or improperly located:
      a. Backing shall consist of a minimum of either 3 x 6 flat Douglas Fir or 16 gauge 50 KSI sheet metal.
   2. On completion of installation, provide a Woodwork Institute CSIP Certificate identifying the work covered and certifying that installation meets the requirements of the WI CSIP attachment details and schedules.
   3. All fees charged by the Woodwork Institute for their CSIP are the responsibility of the millwork installer and shall be included in their bid.

F. Pre-Installation Conference:
   1. Refer to Section 01 31 00 - Project Management and Coordination.

1.7 WARRANTY

A. Warranty the work specified herein for five (5) years against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials and workmanship.

B. Defects shall include but not be limited to the following:

1. Rough or difficult operation, or loose or missing parts.
2. Delamination of surfaces.
3. Noticeable deterioration of finish.
4. Warped or misaligned surfaces or telegraphing of subsurface imperfections.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver completed laminate clad casework, countertops, and related products only after wet operations in building are completed. Store in ventilated place, protected from the weather, with relative humidity range of 20 to 50 percent.

B. Protect finished surfaces from soiling and damage during handling and installation with a protective covering.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.

B. Substitutions: Refer to Section - 01 25 00 - Subsitution Procedures.
   1. Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution

2.2 MILLWORK MATERIALS

A. Plastic Laminate:
   1. Manufacturers:
      a. Abet Laminati: abetlaminati.com.
      b. Formica: www.formica.com.
      c. Panolam: panolam.com/hpl-high-pressure-laminate.
      d. Wilsonart: www.wilsonart.com.
   2. High-pressure decorative laminate complying with NEMA LD3, and the following requirements:
      a. Exterior Color Selection Available:
         1) Architect to select from minimum of 250 selections available, including wood grain patterns and solid colors.
         2) Provide five (5) different colors available per project.
      b. PL-1: Plastic Laminate .
         1) Manufacturer: Wilsonart.
         2) Color: Silicon EV, 4811.
         3) Finish: Matte.
         4) Location: As indicated on Drawings.
      c. PL-2: Plastic Laminate .
         1) Manufacturer: Wilsonart.
         2) Color: Pasadena Oak, 7986.
         3) Finish: Matte.
         4) Location: As indicated on Drawings.
      d. PL-3: Plastic Laminate .
         1) Manufacturer: Wilsonart.
         2) Color: Hampton Walnut, 7959.
         3) Finish: Matte.
         4) Location: As indicated on Drawings.
      e. If laminate has wood grain, direction of grain shall be vertical on door, end panels, fascia panels, and exposed backs; horizontal on drawer faces, aprons, and top rails.
   3. Laminate Grades:
      a. Exposed doors, finished end panels, and other vertical surfaces: GP28 (0.028 inch thick nominal)

b. Horizontal surfaces other than top: GP28 (0.028 inch thick nominal)
c. Cabinet Liner: CL20 (0.020 inch nominal), white.
d. Work surfaces and countertops: GP50 (0.050 inch thick nominal) with BK20 (0.20-inch thick) backer sheet.
e. Backsplash: PH42 (0.042 inch nominal) with nominally balanced backer sheet.

4. Adhesive: PVA water resistant adhesive. Contact adhesives not permitted.
5. Pressure Fused Laminate:
   a. NEMA LD3 VGL, and NEMA LD3 CLS, melamine resin impregnated, 120-gram PSM minimum, thermofused to core under pressure.
   b. Color:
      1) Closed interiors, underside of wall cabinets: White.
      2) Exposed and semi-exposed open cabinets: Match exterior.
   c. Provide balanced construction with same thermofused melamine. Unsurfaced coreboard or simple backers not allowed.

B. Core Material:
1. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
2. Medium-density fiberboard: ANSI A208.2, Grade MD.
3. Plywood: Shop sanded, exterior grade veneer cored, hardwood faced, any species, with no defects affecting strength or utility. Overlay plywood not permitted. Plywood allowed at countertops and toe-base only.
4. Water resistant treated plywood shall have 24-hour thickness swell factor of five percent (5%) or less and 24 hour water absorption factor of ten percent (10%) or less; P.S. 51, Type II or better.
5. Cabinet components shall be of the following minimum core thicknesses:
   a. Cabinet Backs, Drawer Body, and Drawer Bottoms: 1/2 inch particleboard.
   b. Door and Drawer Face, Base, Wall, and Tall Cabinet Tops and Bottoms, Cabinet Sides, Drawer Spreaders, Cabinet Back Rear Hangstrips, Structural Dividers, and Exposed Cabinet Backs: 3/4 inch particleboard.
   c. Work Surfaces and Countertops: Minimum 1 inch particleboard or plywood. Use water resistant treated plywood core at counters with sinks.
   d. Shelves: 3/4 inch particleboard core for 30 inches long or less, 1 inch thick particleboard core for more than 30 inches long; 14-inch deep, unless otherwise noted. Provide vertical dividers for shelves over 36 inches long.
   e. Cabinet toe-base: 3/4 inch plywood. No particleboard within 3 inches of floor.

C. Countertops:
1. Refer to Section 12 36 00 - Countertops.

D. Toe Spaces:
1. Leave toe spaces unfinished for installation of resilient base, unless otherwise shown.

E. End Panels and Filler Strips:
1. Match adjacent case-piece.

F. Edging:
1. Provide the following in accordance with “Edging Locations:”
   a. Plastic Laminate: Refer to Plastic Laminate in this Section.
2. Edging Locations:
   a. Cabinet body edge, including door/drawer front spacer rail:
      1) Plastic Laminate to match cabinet body face.
   b. Forward edge of interior body components, interior dividers, shelf, and top edges of drawer body:
      1) Plastic Laminate to match cabinet body face.
   c. Door/drawer-front edging:
      1) Plastic Laminate to match door/drawer face.

G. Wood Door Framing:

1. Basis of Design: Flametech manufactured by Navy Island, LLC.
2. Species: As selected by the Architect from manufacturer's full line.
3. Finish: As selected by the Architect from manufacturer's full line.

2.3 CABINET HARDWARE

A. All hardware shall meet BHMA A156.9 and shall be subject to approval by the Architect. All keying shall match existing master key system and be approved by the Owner:
   1. Acceptable manufacturers:
      a. Knape & Vogt.
      b. As specified herein, provide specified product, or Architect approved equal.

B. Hinges:
   1. One pair per door to 48 inches height. One and one-half pair over 48 inches in height. Hinge shall accommodate 13/16 thick laminated door and allow 270-degree swing.
   2. Finish: US26D.

C. Pulls:
   1. 4 Inch Wire:
      a. Wire design, 4 inches long.
      b. Finish: atin chrome, US26D finish.
   2. 5 inch Wire:
      a. Back mounted, solid metal, 5 inches long, 2-1/2 inches deep, and 5/16 inch in diameter.
      b. Finish: Anodized Aluminum.

D. Sliding Door Hardware:
   1. Frameless 1/4 inch glass sliding doors; double track rolling door assembly.
   2. Framed 13/16 inch thick stile and rail sliding doors; top mounted track with dual roller hangers. Vertical adjustment for accurate alignment.

E. Drawer Slides:
   1. Standard drawers: 3/4 extension, self-closing, white epoxy-coated, lever disconnect, positive in-stop/out-stop, nylon rollers, minimum 100-pound dynamic load rating at full extension.
   2. File drawers: Full extension, three-part progressive opening slide, precision steel ball bearing, minimum 100-pound dynamic load rating at full extension, zinc plated or epoxy coated at manufacturer’s option.
   3. Provide body mounted molded rails for hanging file system for legal or letter size as indicated by manufacturer’s model number. Cutting or machining of drawer body/face not permitted.
   4. Paper storage drawers: Full extension, self-closing, white epoxy-coated, lever disconnect, positive in-stop/out-stop, nylon rollers, minimum 150-pound dynamic load rating at full extension.

F. Catches:
   1. Provide opening resistance in compliance with the Americans with Disabilities Act:
      a. Provide top-mounted magnetic catch for base and wall cabinet door.
      b. Provide two (2) at each tall cabinet door. Catch housing shall be molded in White.

G. Adjustable Shelf Supports:
   1. Dual-pin design with anti-tip-up shelf restraints for both 3/4 inch and 1 inch shelves.
   2. Include keel to retard shelf slide-off, and slot for mechanical attachment of shelf to clip.
   3. Load rating shall be minimum 300 pounds each support without failure.
   4. Basis of Design: Products manufactured by Knape and Vogt.
      a. Standard: Model 255 Steel.
      b. Supports: Model 256.

H. Wardrobe Rod: 1-1/6 inch diameter plated steel rod, with captive sockets.

I. Coat Hooks: Single and double prong, wall mount - satin aluminum.

J. Locks: Five-disk tumbler cam-style with strike. Locks on cabinets in same room keyed alike. Provide two (2) keys per room where doors and drawers are scheduled to receive locks. Dull

chrome finish. Lock core shall be removable with a control key, permitting Owner to change lock arrangements without tools.

2.4 SPECIALTY ITEMS

A. Grommets:
   1. Approved Product/Manufacturer: Model No. EDP3 manufactured by Doug Mockett & Company, Inc. (basis of design), Manhattan Beach, CA; (800) 523-1269, or Architect approved equal.
   2. Size: 2-1/2 inches diameter with “Flip-Top”™ tab in cap.
   3. Colors: As selected by Architect from manufacturer’s available colors.
   4. Number/location: Where electrical, telephone, and computer data wiring need to pass through tops whether shown or not.

2.5 BUILT-IN UPHOLSTERED SEATING

A. Upholstery Fabric:
   1. Manufacturer:
      a. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
         1) Absecon Mills.
         2) Arc|Com: www.arc-com.com.
         3) Designtex: www.designtex.com.
         4) Duvaltex: www.duvaltex.com.
         5) Guilford of Maine, a Duvaltex brand: www.guilfordofmaine.com.
         6) Knoll, Inc.: www.knoll.com/shop-textiles.
         7) Maharam: https://www.maharam.com.
      b. Substitutions:
         1) Manufacturers and fabricators not listed must have a minimum of 5 years experience manufacturing products meeting or exceeding the specifications.
   2. Basis of Design:
      a. Fabric Upholstry manufactured by Absecon Mills.
   3. Fabric Requirements:
      a. Material: Approved for use as upholstery
      b. Wear Resistance: At least 100,000 Wyzenbeek.
      c. Stain Resistant.
   4. Fabrication Requirements: Upholstery and cushions to be provided by a company experienced in fabrication of furniture.

B. Upholstery Cushion Fill: As recommended by manufacturer.

C. Upholstered Cushion Attachment: As recommended by manufacturer.

2.6 SOLID STOCK

A. Moisture Content: Percent of moisture in relation to over-dry weight shall be between eight percent (8%) and 13 percent at time of installation.

B. Natural Finish Hardwood:
   1. Occasional knot permitted provided it is tight and smooth.
   2. Grain pattern: Rift-cut.
   3. Species: WI "Premium" Grade, White Oak.

C. Paint Grade Hardwood: Any species, including Parana Pine, except do not use oak, elm, or similar species that have coarse grain.

2.7 MISCELLANEOUS

A. Utility Shelving: WI "Economy" grade.

B. Telephone/MDF/IDF Board: Provide minimum four foot by eight foot by 3/4 inch (4’ x 8’ x 3/4”) thick plywood for telephone/data punch down blocks and video equipment in accordance with

Section 06 10 00: Rough Carpentry. Paint in accordance with Section 09 90 00: Painting and Coating.

2.8 MILLWORK FABRICATION

A. Use the WI Custom Grade woodwork classification unless noted elsewhere complying with referenced quality standard.

B. Fabricate casework, countertops, and related products to dimensions, profiles, and details shown on Drawings. Fabricate casework square, plumb, and true.

C. Detailed Requirements for Cabinet Construction:
   1. Toe-Base:
      a. Continuous, ladder type platform with concealed fastening to cabinet bottom, level and secured to floor.
      b. Toe-base at exposed cabinet end panels shall be recessed 1/4 inch from face of finished end for flush installation of finished base material.
      c. No cabinet sides-to-floor will be allowed.
   2. Cabinet Top and Bottom:
      a. Solid sub-top shall be furnished for all base and tall cabinets.
      b. At cabinets over 36 inches, bottoms and tops shall be mechanically joined by a fixed divider.
      c. Assembly devices shall be concealed on bottom side of wall cabinets.
   3. Cabinet Sides:
      a. Doweled, and glued under pressure, or attached with fully concealed interlocking mechanical fasteners to sub-top and bottom.
      b. Drill holes for adjustable shelves 1-1/4 inch on center.
   4. Cabinet Backs:
      a. Side bound, captured in grooves, recessed from cabinet rear, and securely fastened at top and bottom.
      b. Hang rails shall be located at rear of cabinet back and fastened to cabinet sides. Provide minimum of two (2) at base, two (2) at wall, and three (3) at tall cabinets as instructed by casework manufacturer.
      c. Provide removable back panels and closure panels for plumbing access at all sink cabinets, and where shown on Drawings.
   5. Exposed end corner and face frame attachment:
      a. Butt joint, glued and finish nailed; or attached with fully concealed interlocked mechanical fasteners.
   6. Door and Drawer Fronts:
      a. Drawer fronts and hinged doors shall overlay the cabinet body. Maintain a maximum 1/8 inch reveal between pairs of doors, between door and drawer front, or between multiple drawer fronts within the cabinet.
      b. Where indicated, provide stile and rail doors with full 1/4 inch plate glass, hinged or sliding. Exposed lite-opening edges shall be trimmed and glazed with extruded glazing bead.
      c. Where indicated, frameless sliding glass doors shall be 1/4 inch thick plate glass with ground and polished edges. Fit with anodized aluminum shoes and nylon rollers.

D. Drawers:
   1. Drawer fronts: Apply to separate drawer body component sub-front.
   2. Drawer sides: Doweled to receive front and back, glued under pressure, machine squared.
   3. Drawer bottom: Set into front and sides, 1/4 inch deep groove with minimum 3/8 inch standing shoulder, continuously glued. Reinforce drawer bottoms with 1/2 inch by 4 inch front-to-back intermediate underbody stiffeners, mechanically fastened. One (1) at 24 inches, two (2) at 36 inches, and over.
   4. Paper Storage Drawers: Fitted with full width hood at back.

5. Hanging file drawers shall be fabricated to accept letter size hanging folders compatible with Pendaflex system.

E. Vertical and Horizontal Dividers: As required by manufacturer for type and style of component.

F. Door/Drawer Front Rail: As required by manufacturer for type and style of component, and hardware placement.

G. Typical Desk or Counter Height at Knee Space Locations: 30 inches A.F.F.

PART 3 EXECUTION

3.1 JOB CONDITIONS

A. Environmental Requirements:
   1. Do not install casework until permanent HVAC systems are operating and temperature and humidity have been stabilized for at least one (1) week:
      a. Manufacturer/supplier shall advise Contractor of temperature and humidity requirements for architectural casework installation areas.
      b. After installation, control temperature and humidity to maintain relative humidity between 25 and 55 percent.

B. Conditions: Do not store or install casework in building until concrete, masonry, and drywall/plaster work is dry.

3.2 COORDINATION

A. Coordinate the work of this Section with plumbing work specified in Division 22. Coordinate sink opening construction with sinks specified in Division 22 or as indicated on Drawings.

B. Coordinate location of blocking in walls for installation and support of wall cabinets.

3.3 MILLWORK INSTALLATION

A. Positioning: Place approximately level, plumb, and at right angles to adjacent work.

B. Fitting: Where field cutting or trimming is necessary, perform in a neat, accurate, professional manner without damaging the products and adjacent work.

C. Anchorage: Attach securely so the products will perform to their maximum ability without damage from inadequate fastenings.

D. Fasten tops to frames with concealed clips, screws, and glue.

E. Install simulated wood trim in locations shown on Drawings and in accordance with manufacturer's instructions.

3.4 EXISTING DOOR LAMINATE RESURFACING

A. Resurfacing procedures shall be in accordance with the recommendations and instructions of the laminate and adhesive manufacturers.

B. Acclimate laminate to the same environment as existing material at least 48 hours. Perform work in well-ventilated area, out of the way of construction dust and traffic to maintain clean adhesion.

C. Clean the substrate with detergent or non-flammable solvent as instructed by laminate manufacturer to remove wax, grease, and polish deposits.

D. Using a belt sander or sander instructed by manufacturer, sand entire surface to remove original finish. Remove sanding dust thoroughly.

E. Coat the sanded surface and back of laminate with a uniform coating of contact adhesive. Allow to dry thoroughly prior to assembling. Assembling wet adhesive lines will trap solvent and may result in poor bonding. Follow the adhesive manufacturer's instructions.

F. Index the laminate with the substrate. Make initial contact by smoothing with palms. Apply pressure using a "J" roller or rotary press. Allow to set as instructed by adhesive manufacturer to achieve full adhesion to maintain warranty. Trim with recommended tools.

G. Apply laminate to door faces and exposed vertical edges. Apply edges before face. Paint top and bottom edges to color match facing.

H. Coordinate hardware and vision lite cutouts with work of other Sections.

3.5 FINISH HARDWARE INSTALLATION

A. The supplier will mark each item of hardware for location. Protect the markings until each item is installed. If any item is delivered to the job not properly marked, return it to the supplier for marking before attempting to install it.

B. Check markings on hardware for proper location. Install and make necessary adjustments for proper working order. Any hardware damaged by improper adjustment or careless abuse will be replaced by Contractor at his expense.

C. Provide clean, properly sized, and accurately placed mortises and drilled holes for all mortise hardware such as locksets and for cylindrical locks where specified only.

D. Fit all surface-applied hardware accurately.

E. After hardware is installed, protect exposed surfaces by use of heavy paper and masking tape and maintain until job completion.

F. Remove all finish hardware except that which is primed for painting before painter's finish is applied. Permanently replace and re-adjust for proper function after painter's finish has dried hard.

G. Millwork Contractor shall be responsible for hardware on millwork.

3.6 PLASTIC LAMINATE FACED WOOD DOOR INSTALLATION

A. Protect all doors during handling.

B. Install doors in accordance with manufacturer’s instructions.

C. Install and adjust doors for smooth, quite operation.

END OF SECTION 06 20 00

SECTION 07 16 00 - BELOW GRADE WATERPROOFING

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Preparation of concrete surfaces to receive waterproofing membrane.

B. Sealing of cracks and joints.

C. Fluid applied waterproofing system, with prefabricated drainage composite or protection board at walls that fall below grade (auditorium, basement, elevator pit, etc.).

D. Pre-applied waterproofing system, with joint sealing tape, and other accessories at below grade horizontal surfaces under the slab or elevator pit.

1.2 RELATED SECTIONS

A. Section 03 30 00 - Cast-In-Place Concrete

B. Section 07 92 00 - Building Sealants

C. Division 23 - Mechanical: Mechanical penetrations, such as floor drains and piping, through waterproofing membrane.

D. Division 26 - Electrical: Electrical penetrations, such as conduit, through waterproofing membrane.

1.3 SUBMITTALS

A. Product Data:
   1. Manufacturer's specifications and other data needed to prove compliance with specified requirements.
   2. Manufacturer's installation instructions.

B. Certifications:
   1. Manufacturers certification that applicator is approved by Manufacturer.
   2. Manufacturer’s affidavit that materials used in Project contain no asbestos.

C. Warranty: Submit a sample warranty identifying the terms and conditions stated in warranty.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications: Applicator shall be experienced in applying the same or similar materials and shall be specifically approved in writing by the membrane system Manufacturer.

B. Regulatory Requirements: Comply with applicable codes, regulations, ordinances, and laws regarding use and application of products that contain volatile organic compounds (VOC).

1.5 PRE-INSTALLATION CONFERENCE

A. A Pre-Installation Conference is mandatory prior to beginning work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials job site in original, factory-sealed, unopened containers bearing Manufacturer's name and label intact and legible with following information.
   1. Name of material.
   2. Manufacturer's stock number and date of manufacture.
   3. Material safety data sheet (MSDS).

B. Store and handle in strict compliance with Manufacturer’s instructions, recommendations and material safety data sheet (MSDS).

C. Protect from damage from sunlight, weather, excessive temperatures and construction operations.

D. Remove damaged material from the site and dispose of in accordance with applicable regulations.

E. Do not double-stack pallets of waterproofing on the job site. Provide cover on top and all sides.

F. Store drainage composite and protection board flat and off the ground. Provide cover on top and all sides.

G. Protect waterproofing materials from freezing. In cool temperatures, store the material for several hours at room temperature to facilitate mixing and application.

H. Sequence deliveries of materials to avoid delays but minimize on-site storage.

1.7 PROJECT CONDITIONS

A. Perform work only when existing and forecasted weather conditions are within the limits established by the Manufacturer of the materials and products used.

B. Proceed with installation only when substrate construction and preparation work is complete and in condition to receive membrane waterproofing.

C. Coordinate waterproofing work with other trades to ensure adequate illumination, ventilation, and dust-free environment during application and curing of membrane. The applicator shall have sole right of access to the specified areas for the time needed to complete the application and allow the membrane to cure adequately.

D. Protect adjoining surfaces not to be coated against damage or soiling. Protect plants, vegetation and animals which might be affected by waterproofing operations.

E. Warn personnel against breathing of vapors and contact of material with skin or eyes. Wear applicable protective clothing and respiratory protection gear.

F. Keep products away from spark or flame. Do not allow the use of spark producing equipment during application and until all vapors have dissipated. Post "NO SMOKING" signs.

G. Maintain work area in a neat and orderly condition, removing empty containers, rags, and rubbish daily from the site.

1.8 WARRANTY

A. Warrant the work specified herein for ten (10) years against becoming unserviceable or causing an objectionable appearance resulting from either defective or non-conforming materials and workmanship.

PART 2 - PRODUCTS

2.1 FLUID APPLIED WATERPROOFING SYSTEM - POST APPLIED

A. Specifications are based on named Manufacturer's products and systems listed below. Other Manufacturers must have a minimum of five (5) years' experience manufacturing equivalent products to those specified and comply with Division 1 requirements regarding substitutions to be considered.
   1. AVM Industries, Inc. Canoga Park, CA (AVM Aussie Membrane 500)
   2. Carlisle Coatings and Waterproofing Incorporated, Wylie, TX (Barricoat)
   3. GCP Applied Technologies, Cambridge, MA (Procor)
   4. W. R. Meadows, Inc., Hampshire, IL (Mel-Rol LM)

B. Fluid Applied Waterproofing Membrane: Water-based rubber and / or bitumen liquid / fluid applied waterproofing membrane modified with high performance rubberized polymers and special additives for use in vertical seamless applications.

   Waterproofing Membrane Physical Properties, minimum:

Property	Test Method	Typical Value
Cured / Dry Film Thickness	ASTM D3767	60 mils
Solids Content	---	62%
Low Temp Flexibility	ASTM C836	Pass
Elongation	ASTM D412	500%
Pliability	ASTM D1970	Unaffected
Resistance to Standing Water	ASTM D2939	Pass

C. Accessory Products:
   1. Protection Coarse: Prefabricated drainage composite material designed to promote positive drainage while serving as a protection course. Provide product consisting of an impermeable polymeric sheet cuspated under heat and pressure to form a high flow dimpled drainage core with a bonded layer of nonwoven filter fabric.

D. Locations: Vertical below-grade structural concrete foundation walls opposite conditioned and habitable areas that fall below grade 0'-0" and where shown on drawings.

2.2 SHEET APPLIED WATERPROOFING SYSTEM - POST APPLIED

A. Specifications are based on named Manufacturer's products and systems listed below. Other Manufacturers must have a minimum of five (5) years' experience manufacturing equivalent products to those specified and comply with Division 1 requirements regarding substitutions to be considered.
   1. Carlisle Coatings and Waterproofing Incorporated, Wylie, TX (MiraDRI 860/861)
   2. W. R. Meadows, Inc., Hampshire, IL (Mel-Rol)

B. Sheet Applied Waterproofing Membrane: Self-adhering sheet membrane consisting of rubberized asphalt laminated to a polyethylene film.

Waterproofing Membrane Physical Properties, minimum:

Property	Test Method	Typical Value
Thickness	ASTM D3767	60 mils
Low Temp Flexibility	ASTM D1970	Pass
Elongation	ASTM D412	350%
Puncture Resistance	ASTM E154	50 lbf
Hydrostatic Head	ASTM D5385	230 ft

C. Accessory Products:
1. Primer: Manufacturer's recommended spray or roller applied water-based adhesive.
2. Detail Sealant: Manufacturer's recommended sealant material for use at penetrations, cut edges, top edge terminations, transitions, etc. and adhesion for the protection course.
3. Detail Strip: Manufacturer's recommended waterproofing membrane material.
4. Protection Coarse: Prefabricated drainage composite material designed to promote positive drainage while serving as a protection course. Provide product consisting of an impermeable polymeric sheet cuspated under heat and pressure to form a high flow dimpled drainage core with a bonded layer of nonwoven filter fabric.
5. Termination Bar: High strength, pre-formed, multi-purpose plastic strip with holes 6" o.c.

D. Locations: Vertical and horizontal below-grade structural concrete foundation walls opposite conditioned and habitable areas that fall below grade 0'-0" and where shown on drawings.

2.3 SHEET APPLIED WATERPROOFING SYSTEM - PRE-APPLIED

A. Specifications are based on named Manufacturer's products and systems listed below. Other Manufacturers must have a minimum of five (5) years' experience manufacturing equivalent products to those specified and comply with Division 1 requirements regarding substitutions to be considered.
1. AVM Industries, Inc. Canoga Park, CA (AVM Aussie Skin 550G)
2. GCP Applied Technologies, Cambridge, MA (Preprufe 200)

B. Sheet Waterproofing Membrane: Composite sheet comprising a heavy duty, puncture resistant, HDPE film, an aggressive pressure sensitive adhesive and a weather resistant protective coating. Membrane provides a continuous seal that resists water ingress and migration between the membrane and the structure.

C. Accessory Products:
1. Pressure Sensitive Tape: Two-sided, reinforced, pressure sensitive tape constructed with a highly aggressive adhesive. Material to form a continuous and integral seal to the structure (GCP Prefrufe CJ Tape).
2. Detail Sealant: Manufacturer's approved sealant intended for use sealing around penetrations.

D. Locations: Vertical below-grade structural concrete foundation walls opposite conditioned and habitable areas as well as horizontal surfaces below the slab that fall below grade 0'-0" and where shown on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Before waterproofing work is started the all surfaces to be waterproofed shall be thoroughly examined for all deficiencies. Should deficiencies exist, the Architect shall be notified in writing and corrections made.

3.2 SURFACE PREPARATION

A. Surfaces to which waterproofing is to be applied shall be thoroughly clean, dry and free from all surface contaminates or cleaning residue that may harmfully affect the adhesion of the membrane.

B. Repair all cracks in accordance with Manufacturer's instructions.

3.3 APPLICATION

A. Priming: Shall be in accordance with membrane Manufacturer's instructions.

B. Apply waterproofing in accordance with membrane Manufacturer's instructions.

C. Liquid membrane waterproofing on vertical walls shall positively overlap turned up sheet membrane waterproofing from under slab as instructed by the Manufacturer.

D. Where shown or required, install specified perimeter drainage system as the first course of drainage composite immediately after membrane has cured on vertical surfaces. Install Manufacturer's recommended drainage composite or protection board / protection course on remainder.

END OF SECTION 07 16 00

SECTION 07 21 00 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: Requirements including but not limited to:
   1. Extruded polystyrene foam plastic board.
   2. Polyisocyanurate foam plastic board.
   3. Glass mineral fiber blanket.
   4. Rock mineral wool blanket.
   5. Rock mineral wool board.
   6. Accessories necessary for a complete installation.

1.3 REFERENCE STANDARDS

A. ASTM C167 - Standard Test Methods for Thickness and Density of Blanket or Batt Thermal Insulations; 2018.

B. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.

C. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013 (Reapproved 2019).

D. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2023.

E. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014 (Reapproved 2019).

F. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2023.

G. ASTM C727 - Standard Practice for Installation and Use of Reflective Insulation in Building Constructions; 2019.

H. ASTM C764 - Standard Specification for Mineral Fiber Loose-Fill Thermal Insulation; 2025.

I. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2023).

J. ASTM C1104/C1104M - Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation; 2019.

K. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2021.

L. ASTM C1320 - Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction; 2020.

M. ASTM C1321 - Standard Practice for Installation and Use of Interior Radiation Control Coating Systems (IRCCS) in Building Construction; 2015.

N. ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings; 2019.

O. ASTM C1744 - Standard Practice for Installation and Use of Radiant Barrier Systems (RBS) in Commercial/Industrial Building Construction; 2019.

P. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

Q. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.

R. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 °C; 2022.

S. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2023.

T. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.4 SUBMITTALS

A. Refer to Section 01 33 00 - Submittal Procedures for submittal procedures.

B. Product Data: Technical data and installation instructions for each type of insulation product specified.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Manufacturer's Installation Instructions.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Fire Performance Characteristics: Identify products with appropriate markings of applicable testing and inspecting organization
      a. Surface Burning Characteristics: Per ASTM E84.
         1) Flame Spread Index: Maximum 25.
         2) Smoke Developed Index: Maximum 450.
      b. Fire Resistance Ratings: Per ASTM E119.
      c. Combustion Characteristics: Non-combustible per ASTM E136.
   2. Underwriter's Laboratories UL 723 Tests for Surface Burning Characteristics of Building Materials.

B. Single Source Responsibility for Insulation Products: Obtain each type of building insulation from single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of work.
   1. Mark insulation boards and packages with manufacturer's name and product designation. Unmarked boards and packages will be rejected.

C. Environmental Requirements:
   1. Manufacture extruded polystyrene with HCFC or other CFC free blowing agents.
   2. Insulations shall not contain formaldehyde, asbestos, lead, mercury, mercury compounds, or polybrominated diphenyl ether fire retardants.
   3. Wherever possible, provide boards from manufacturers who recycle insulation materials.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect foam plastic board insulation:
   1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
   2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.
   3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

1.7 PROJECT CONDITIONS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

B. Sequence work to ensure fireproofing and firestop materials are in place before beginning work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
   1. CertainTeed Corporation: www.certainteed.com/building-insulation.
   2. DuPont de Nemours, Inc.: www.dupont.com.
   3. Hunter Panels: www.hunterpanels.com.
   4. Johns Manville; a Berkshire Hathaway company
   5. Kingspan Group:www.kingspan.com/us/en.
   6. Knauf Insulation: www.knaufinsulation.com.
   7. Owens Corning: www.owenscorning.com/en-us/insulation/commercial.
   8. Rmax, a subsidiary of the Sika Corporation: www.rmax.com.
   9. Rockwool A/S: www.rockwool.com/north-america.

B. Substitutions: Refer to Section - 01 25 00 - Substitution Procedures.
   1. Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution.

2.2 EXTRUDED POLYSTRENE FOAM BOARD

A. Extruded Polystrene Foam Board: ASTM C578, Type IV.
   1. Subject to compliance with the requirements of this Section, provide one of the following:
      a. Styrofoam Cavitymate Plus manufactured by DuPont de Nemours, Inc.
      b. GreenGuard manufactured by Kingspan Group.
      c. Foamular CW25 manufactured by Owens Corning.

2.3 POLYISOCYANURATE FOAM PLASTIC BOARD

A. Polyisocyanurate Board, Foil Faced: ASTM C1289, foil faced, Type I, Class 1 or 2.
   1. Subject to compliance with the requirements of this Section, provide one of the following:
      a. Thermax manufactured by DuPont de Nemours, Inc.
      b. Xci manufactured by Hunter Panels.
      c. ECOMAXci manufactured by Rmax, Inc.
   2. Fire Propagation Characteristics: Pass NFPA 285 testing as part of an approved assembly.

2.4 GLASS MINERAL FIBER INSULATION

A. Glass Mineral Fiber Batt, Unfaced: ASTM C665, Type I (unfaced); with maximum flame spread and smoke developed indexes of 25 and 50, respectively, per ASTM E84; passing ASTM E136 for combustion characteristics.
   1. Subject to compliance with the requirements of this Section, provide one of the following:
      a. CertaPro manufactured by CertainTeed Corporation.
      b. Johns Manville; a Berkshire Hathaway company.
      c. EcoBatt with ECOSE manufactured by Knauf Insulation.
      d. PINK Next Gen Fiberglas manufactured by Owens Corning.

B. Glass Mineral Fiber Board:
   1. Subject to compliance with the requirements of this Section, provide one of the following:
      a. CertainTeed Corporation.
      b. Johns Manville; a Berkshire Hathaway company.
      c. Earthwool manufactured by Knauf Insulation.
      d. Fiberglas 700 Series Board manufactured by Owens Corning.
   2. Fire Performance:
      a. Combustibility: Non-combustible per ASTM E136.
      b. Surface Burning Characteristics: Per ASTM E84.
         1) Flame Spread: 0.

2) Smoke Developed: 0.
3. Thermal Resistance:
4. Water Vapor Permeance: 27.2 Perm minimum.
5. Moisture Absorption: 1% maximum per ASTM C1104/C1104M.
6. Fungi Resistance: Zero mold growth per ASTM C1338.
7. Corrosive Resistance:
   a. Steel per ASTM C665: Pass.
   b. Stainless Steel per ASTM C795: Pass.

2.5 ROCK MINERAL FIBER INSULATION

A. Rock Mineral Fiber Blanket: ASTM C665, Type I, complying with ASTM E136 smoke developed and flame spread of 0.
   1. Subject to compliance with the requirements of this Section, provide one of the following:
      a. Thermafiber UltraBatt. manufactured by Owens Corning.
      b. ComfortBatt manufactured by Rockwool A/S.
   2. Fire Performance:
      a. Combustibility: Non-combustible per ASTM E136.
      b. Surface Burning Characteristics: Per ASTM E84.
         1) Flame Spread: 0.
         2) Smoke developed: 0.
   3. Thermal Resistance: To ASTM C518.
   4. Density: 2 lbs/ft3 to ASTM C167.

B. Rock Mineral Fiber Board: ASTM C612, Type IVB.
   1. Subject to compliance with the requirements of this Section, provide one of the following:
      a. Thermafiber manufactured by Owens Corning.
      b. CavityRock manufactured by Rockwool A/S.
   2. Fire Performance:
      a. Combustibility: Non-combustible per ASTM E136.
      b. Surface Burning Characteristics: Per ASTM E84.
         1) Flame Spread: 0.
         2) Smoke Developed: 0.
   3. Thermal Resistance:
      a. 2” and less R value/1 inch at 75 ºF: 4.2 h ft2 ºF/Btu per ASTM C518.
      b. 2” and greater R value/1 inch at 75 ºF: 4.3 h ft2 ºF/Btu per ASTM C518.
   4. Water Vapor Permeance: 27.2 Perm minimum
   5. Moisture Absorption: 1% maximum per ASTM C1104/C1104M.
   6. Fungi Resistance: Zero mould growth per ASTM C1338.
   7. Corrosive Resistance:
      a. Steel per ASTM C665: Pass.
      b. Stainless Steel per ASTM C795: Pass.

2.6 INSULATION FASTENERS

A. Adhesively Attached, Spindle Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.
   1. Plate: Perforated, galvanized carbon steel sheet, 0.030 inch thick by 2 inches square.
   2. Spindle: Copper coated, low carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation.

B. Adhesively Attached, Angle Shaped, Spindle Type Anchors: Angle welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.
   1. Angle: Formed from 0.030 inch thick, perforated, galvanized carbon steel sheet with each leg 2 inches square.

2. Spindle: Copper coated, low carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation.

C. Insulation Retaining Washers: Self-locking washers formed from 0.016 inch thick galvanized steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.
   1. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in the following locations:
      a. Crawl spaces.
      b. Ceiling plenums.
      c. Attic spaces.

D. Insulation Standoff: Spacer fabricated from galvanized mild steel sheet for fitting over spindle of insulation anchor to maintain air space of 1 inch between face of insulation and substrate to which anchor is attached.

E. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates without damaging insulation, fasteners, or substrates.

2.7 ACCESSORIES

A. Insulation for Miscellaneous Voids:
   1. Glass Fiber Insulation: ASTM C764, Type II, loose fill; with maximum flame spread and smoke developed indexes of 5, per ASTM E84.

B. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

C. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide ventilation between insulated attic spaces and vented eaves.

PART 3 EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

B. Board and Batt Insulation: Install insulation that is undamaged, dry, and unsoiled and has not been exposed to ice, rain, or snow at any time.
   1. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Do not seal joints in board insulation. Remove projections that interfere with placement.
   2. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

C. Cavity Wall Insulation: Foam Plastic Board Insulation: Install pads of adhesive spaced approximately 2 inches o.c. both ways on inside face and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates.
   1. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Section 04 05 00 - Common Work Results for Masonry.
   2. Cellular Glass Board Insulation: Install with closely fitting joints using attachment method according to manufacturer's written instructions.

D. Framed Construction, Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
   1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
   2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
   3. Maintain 3 inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
   4. Attics: Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
   5. For metal framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
   6. For wood framed construction, install blankets according to ASTM C1320 and as follows:
      a. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.
   7. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
      a. Glass Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..
      b. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

E. Curtain Wall: Install board insulation in curtain wall construction according to curtain wall manufacturer's written instructions.
   1. Hold insulation in place by securing metal clips and straps or integral pockets within window frames, spaced at intervals recommended in writing by insulation manufacturer to hold insulation securely in place without touching spandrel glass. Maintain cavity width of dimension indicated on Drawings between insulation and glass.
   2. Install insulation to fit snugly without bowing.

F. Reflective Insulation: Install sheet reflective insulation according to ASTM C727.
   1. Install sheet radiant barriers according to ASTM C1744.
   2. Install interior radiation control coating system according to ASTM C1321.

3.3 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07 21 00

SECTION 07 21 19 - FOAMED-IN-PLACE INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Foamed-in-place insulation.
   2. Foamed-in-place intumescent insulation, single-layer monolithic system.
   3. Foamed-in-place intumescent insulation, two-layer hybrid system.
   4. Protective intumescent coating.

B. Related Sections:

1.3 REFERENCE STANDARDS

A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.

B. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics; 2016 (Reapproved 2023).

C. ASTM D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics; 2020.

D. ASTM D1623 - Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics; 2017 (Reapproved 2023).

E. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics; 2019.

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

G. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022a, with Editorial Revision (2023).

H. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.

I. FM 4880 - Evaluating the Fire Performance of Insulated Building Panel Assemblies and Interior Finish Materials; 2017.

J. NFPA 275 - Standard Method of Fire Tests for the Evaluation of Thermal Barriers; 2022.

K. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2023.

L. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2024.

M. UL 1040 - Standard for Safety Fire Test of Insulated Wall Construction; Current Edition, Including All Revisions.

N. UL 1715 - Standard for Safety Fire Test of Interior Finish Material; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week prior to commencing work of this section.

1.5 SUBMITTALS

A. Refer to Section 01 33 00 - Submittal Procedures for submittal procedures.

B. Product Data: Provide product description, insulation properties, overcoat properties, and preparation requirements.

C. Certificates: Certify that products of this section meet or exceed specified requirements.

D. ABAA Field Quality Control Submittals: Submit third-party reports of testing and inspection as required by ABAA QAP.

E. Manufacturer's Installation Instructions: Indicate special procedures, and perimeter conditions requiring special attention.

F. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.

G. ABAA Installer Qualification: Submit documentation of current contractor accreditation and current installer certification. Keep copies of all contractor accreditation and installer certification on site during and after installation. Present on-site documentation upon request.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with not less than three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified, with minimum three years documented experience, and approved by manufacturer.

C. Air Barrier Association of America (ABAA) Quality Assurance Program (QAP); www.airbarrier.org/#sle:
   1. Installer Qualification: Use accredited contractor, certified installers, evaluated materials, and third-party field quality control audit.
   2. Manufacturer Qualification: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture. Use secondary materials approved in writing by primary material manufacturer.

D. Air Barrier Association of America (ABAA) Evaluated Materials Program (EAP); www.airbarrier.org/#sle: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture. Use secondary materials approved in writing by primary material manufacturer.

1.7 FIELD CONDITIONS

A. Do not apply foam when temperature is below that specified by the manufacturer for ambient air and substrate.

B. Do not apply foam when temperature is within 5 degrees F of dew point.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
   1. Foamed-In-Place Insulation:
      a. BASF Corporation: www.spf.basf.com/#sle.
      b. Carlisle Spray Foam Insulation: www.carlislesfi.com/#sle.
      c. Gaco Western: www.gaco.com/#sle.
      d. Henry Company: www.henry.com/#sle.
      e. Huntsman Building Solutions: www.huntsmanbuildingsolutions.com/#sle.
      f. Johns Manville: www.jm.com/#sle.
      g. NCFI Polyurethanes: www.ncfi.com/#sle.
      h. Preferred Solutions, Inc: www.preferredsolutions.net/#sle.
      i. Rhino Linings Corporation: www.rhinolinings.com/#sle.
   2. Foamed-In-Place Intumescent Insulation:
      a. Preferred Solutions, Inc: www.preferredsolutions.net/#sle.

B. Substitutions: Refer to Section - 01 25 00 - Substitution Procedures.

1. Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution

2.2 MATERIALS

A. Foamed-In-Place Intumescent Insulation (Two-Layer Hybrid System): Foamed on-site using blowing agent of non-ozone-depleting gas.
   1. Regulatory Requirements: Comply with applicable code for flame and smoke, concealment, and fire protection requirements.
      a. Fire Protection: Provide 15-minute thermal barrier of 1/2 inch gypsum board or equivalent material complying with NFPA 275 test method or foamed-in-place insulation either exposed or with covering that complies with FM 4880, NFPA 286, UL 1040, or UL 1715.
   2. Base Layer: Medium-density, semi-rigid, closed-cell, spray polyurethane foam.
      a. Thermal Resistance: R-value of 7.0, minimum, per 1 inch thickness at 140 degrees F mean temperature, at 90 days, when tested in accordance with ASTM C518.
      b. Water Vapor Permeance: 0.95 perms, maximum, when tested at 1 inch thickness in accordance with ASTM E96/E96M.
      c. Closed Cell Content: At least 98 percent.
      d. Density: 2.0 lbs/cu ft, nominal, in accordance with ASTM D1622.
      e. Tensile Strength: 62 psi, minimum, in accordance with ASTM D1623.
      f. Compressive Strength: 21 psi, minimum, in accordance with ASTM D1621.
      g. Surface Burning Characteristics: Flame spread/Smoke developed index of 75/450, maximum, at 4 inch thick when tested in accordance with ASTM E84.
   3. Top Layer (Exposed Surface Layer): Medium-density, semi-rigid, two-part, closed-cell, intumescent, spray polyurethane foam.
      a. Thermal Resistance: R-value of 5.7, minimum, per 1 inch thickness at 140 degrees F mean temperature, at 90 days, when tested in accordance with ASTM C518.
      b. Water Vapor Permeance: 0.99 perms, maximum, when tested at 3.5 inch thickness in accordance with ASTM E96/E96M.
      c. Air Permeance: Less than 0.002 cfm per sq ft, when tested at 1 inch thickness in accordance with ASTM E2178 at 1.57 psf.
      d. Closed Cell Content: At least 90 percent.
      e. Density: 2.0 lbs/cu ft, nominal, in accordance with ASTM D1622.
      f. Tensile Strength: 55 psi, minimum, in accordance with ASTM D1623.
      g. Compressive Strength: 22 psi, minimum, in accordance with ASTM D1621.
      h. Surface Burning Characteristics: Flame spread/Smoke developed index of 75/450, maximum, at 4 inch thick when tested in accordance with ASTM E84.
   4. Acceptable Products:
      a. Staycell 504/Staycell ONE STEP 502 Hybrid System manufactured by Preferred Solutionsm Inc.

2.3 ACCESSORIES

A. Primer: As required by insulation manufacturer.

B. Protective Coating: Intumescent coating of type recommended by insulation manufacturer and as required to comply with applicable codes.
   1. Coating Type: Single component, water based.
   2. Protected Insulation Type: Spray polyurethane foam (SPF).
   3. Application: Apply using brush, roller, or airless sprayer.
   4. Fire Test: Flame spread index (FSI) of 0 (Zero) and smoke developed index (SDI) of 10 (Ten), when tested in accordance with ASTM E84.
   5. Flammability: Comply with applicable building code requirements.
   6. Exterior Wall System: Comply with NFPA 285.
   7. Color: As indicated on drawings.

8. Acceptable Products:
    a. DC315 Intumescent Coating manufactured by International Fireproof Technology Inc.
    b. FBL-100 Fire Barrier Latex manufactured by International Coatings Group.

C. Soffit Edge Seal: Prefabricated, flexible seal designed for unventilated attic spaces.
1. Applications: Sealing space between wood framing top plate and underside of roof sheathing.
2. Material: Polyvinyl chlorice (PVC).
3. Roof Joist/Truss Spacing: 16 inch on center, nominal.
4. Acceptable Products:
    a. AccuBlock 14-1/2 Inch manufactured by Brentwood Industries, Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify work within construction spaces or crevices is complete prior to insulation application.

B. Verify that surfaces are clean, dry, and free of matter that may inhibit insulation or overcoat adhesion.

3.2 PREPARATION

A. Mask and protect adjacent surfaces from over spray or dusting.

B. Apply primer in accordance with manufacturer's instructions.

3.3 APPLICATION

A. Apply insulation in accordance with manufacturer's instructions.

B. Apply insulation by spray method, to a uniform monolithic density without voids.

C. Apply to a minimum cured thickness as recommended by manufacturer to achieve R-value indicated on Drawings.

D. Apply protective coating to thickness recommended by manufacturer to achieve fire-resistance-rating required.

E. Patch damaged areas.

F. Where applied to voids and gaps assure space for expansion to avoid pressure on adjacent materials that may bind operable parts.

G. Trim excess away for applied trim or remove as required for continuous sealant bead.

3.4 FIELD QUALITY CONTROL

A. Refer to Section 01 40 00 - Quality Requirements for additional requirements.

B. Field inspections and tests will be performed by an independent testing agency.

C. Coordination of ABAA Tests and Inspections:
1. Provide testing and inspection required by ABAA QAP.
2. Cooperate with ABAA testing agency.
3. Allow access to air barrier work areas and staging.
4. Do not cover air barrier work until tested, inspected, and accepted.

3.5 PROTECTION

A. Do not permit subsequent construction work to disturb applied insulation.

END OF SECTION 07 21 19

SECTION 07 27 26 - FLUID APPLIED AIR BARRIER SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. Fluid-applied air barrier membrane in exterior wall assemblies.

B. Materials to bridge and seal the following air leakage pathways and gaps:
   1. Connections of the walls to the roof air barrier.
   2. Connections of the walls to the foundation air barrier.
   3. Seismic and expansion joints.
   4. Openings and penetrations of window frames, storefront, curtain wall and mechanical, electrical and plumbing systems.
   5. Barrier precast concrete and other envelope systems.
   6. Door frames.
   7. Piping, conduit, duct and similar penetrations.
   8. Masonry ties, screws, bolts and similar penetrations.
   9. All other air leakage pathways in the building envelope.

C. Related Work in other Sections includes but is not limited to the following:
   1. Section 03 30 00 – Cast-In-Place Concrete
   2. Section 04 20 00 – Unit Masonry
   3. Section 07 52 19 – Modified Bitumen “Cool Roof” Membrane Roofing System
   4. Section 07 65 00 – Flexible Flashing
   5. Section 07 92 00 – Joint Sealants
   6. Section 09 21 16 – Gypsum Wallboard Systems (Exterior Sheathing)

1.3 PERFORMANCE REQUIREMENTS

A. Material Performance: Provide air barrier materials which have an air permeance not to exceed 0.004 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.004 cfm / ft2 @ 1.57 psf), when tested in accordance with ASTM E2178 (unmodified).

B. Provide materials with a water vapor permeance of 10.0 US perms or greater, determined in accordance with ASTM E96 Water method (Procedure B).

C. Assembly Performance: Provide a continuous air barrier in the form of an assembly that has an air leakage not to exceed 0.04 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.04 cfm/ft2 @ 1.57 psf) when tested in accordance with ASTM E2357. The assembly shall accommodate movements of building materials by providing expansion and control joints as required. Expansion / control joints, changes in substrate and perimeter conditions shall have appropriate accessory materials at such locations.

   1. The air barrier assembly shall be capable of withstanding combined design wind, fan and stack pressures, both positive and negative on the envelope without damage or displacement, and shall transfer the load to the structure.
   2. Fluid applied air barriers shall not displace adjacent materials in the air barrier assembly under full load.

3. The air barrier assembly shall be joined in an airtight and flexible manner to the air barrier materials of adjacent assemblies, allowing for the relative movement of assemblies due to thermal and moisture variations, creep, and anticipated seismic movement.

D. Connections to Adjacent Materials: Provide connections to prevent air leakage at the following locations:

1. Foundation and walls, including penetrations, ties and anchors.
2. Walls, windows, curtain walls, storefronts, louvers or doors.
3. Different wall assemblies, and fixed openings within those assemblies.
4. Wall and roof connections.
5. Floors over unconditioned space.
6. Walls, floor and roof across construction, control and expansion joints.
7. Walls, floors and roof to utility, pipe and duct penetrations.
8. Seismic and expansion joints.
9. All other potential air leakage pathways in the building envelope.

1.4 PRE-INSTALLATION CONFERENCE

A. A Pre-Installation Conference is mandatory prior to starting work.

1.5 SUBMITTALS

A. Submittals: Submit in accordance with Division 1 requirements.

B. Installer Qualifications: Submit evidence of current Contractor accreditation and Installer certification under the Air Barrier Association of America's (ABAA). Submit accreditation number of the Contractor and certification number(s) of the ABAA Certified Installer(s).

C. Product Data: Submit material Manufacturer's Product Data, material Manufacturer's instructions for evaluating, preparing, and treating substrate, temperature and other limitations of installation conditions, Technical Data, and tested physical and performance properties.

1. Submit letter from primary air barrier material Manufacturer indicating approval of materials that are proposed to be used that are not currently listed in the accessories section of this specification for that Manufacturer's material.
2. Include statement from the primary air barrier material Manufacturer that the materials used in their air barrier assembly which will be used to adhere to the underlying substrate are chemically compatible to the substrate material.

D. Samples: Submit clearly labeled samples, three (3) inch by four (4) inch minimum size of each material specified.

E. Field Test Results of Mock-Up: Submit test results of air leakage test and water leakage test of mock-up in accordance with specified standards, including retesting if initial results are not satisfactory.

F. Shop Drawings: Submit Shop Drawings showing locations and extent of air barrier assemblies and details of all typical conditions, intersections with other envelope assemblies and materials, membrane counter-flashings, and details showing how gaps in the construction will be bridged, how inside and outside corners are negotiated, how materials that cover the materials are secured with air-tight condition maintained, and how miscellaneous penetrations such as conduits, pipes, electric boxes and similar items are sealed.

1. Include VOC content of each material, and applicable legal limit in the jurisdiction of the project.

2. Include statement that materials are compatible with adjacent materials proposed for use.
3. Include required values for field adhesion test on each substrate in accordance with ASTM D4541 (modified), using a type II pull tester.

G. Compatibility: Submit letter from primary material Manufacturer stating that materials proposed for use are permanently chemically compatible and adhesively compatible with adjacent materials proposed for use.

1.6 QUALITY ASSURANCE

A. Air Barrier Installer Qualifications: Air barrier Subcontractor(s) shall be accredited at the time of bidding and during the complete installation period by the Air Barrier Association of America (ABAA).

1. Fluid-applied membrane air barrier Installer(s) shall be certified in accordance with the requirements outlined by ABAA. Installers shall have their photo identification air barrier certification cards in their possession and available on the project site, for inspection upon request.

B. Manufacturer: Obtain primary ABAA Evaluated Materials from a single ABAA Evaluated Manufacturer regularly engaged in manufacturing specified fluid-applied membranes. Obtain secondary materials from a source acceptable to the primary materials Manufacturer.

C. Accredited Laboratory Testing for Materials: Laboratory accredited by International Accreditation Service Inc. (IAS), American Association for Laboratory Accreditation (A2LA), or the Standards Council of Canada (SCC).

D. VOC Regulations: Provide products which comply with applicable regulations controlling the use of volatile organic compounds.

E. Preconstruction Meeting: Convene a minimum of two weeks prior to commencing Work of this Section. Agenda shall include, at a minimum, construction and testing of mock-up, sequence of construction, coordination with substrate preparation, air barrier materials approved for use, compatibility of materials, coordination with installation of adjacent and covering materials, and details of construction and chemical/fire safety plans. Attendance is required by the Fluid Applied Air Barrier System Manufacturer’s field representative, representatives of related trades including covering materials, substrate materials and adjacent materials.

F. Mock-Ups: Build mock-up representative of primary air barrier assemblies and glazing assemblies including backup wall and typical penetrations as acceptable to the Architect. Mock-up shall be dimensioned no less than eight (8) feet long by eight (8) feet high and include the air barrier materials and air barrier accessories proposed for use in the exterior wall assembly. The mock-ups shall remain visible and intact for the duration of the fluid applied air barrier system work scopes. Mock-ups shall be suitable for field testing.

G. Mock-Up Tests for Fluid-Applied Membrane Adhesion: The third party testing agency shall test the mock-up for membrane adhesion in accordance with ASTM D4541 (modified), using a type II pull tester except that the membrane shall be cut through to separate the material attached to the disc from the surrounding material. Perform test after curing period recommended by the material Manufacturer. Record mode of failure and area where the material failed in accordance with ASTM D4541. When the air barrier material Manufacturer has established a minimum adhesion level for the product on the particular substrate, the inspection report shall indicate whether this requirement has been met. Where the material Manufacturer has not declared a minimum adhesion value for their product/substrate combination, the value shall simply be recorded.

H. Air Barrier Assembly Testing: Verify air barrier assembly testing by the material Manufacturer by visiting the ABAA website to ensure an ASTM E2357 test has been completed and to obtain results. Visit the ABAA website for the reported air barrier assembly leakage rate and illustrations or CAD details which includes the methods in which the assembly test mock-ups shall be assembled.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original packages with seals unbroken, labeled with material Manufacturer's name, product, date of manufacture, and directions for storage.

B. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by material Manufacturer. Protect stored materials from direct sunlight and other sources of ultra-violet light.

C. Handle materials in accordance with Manufacturer’s recommendations.

1.8 PROJECT CONDITIONS

A. Temperature: Install fluid-applied air barrier material within range of ambient and substrate temperatures recommended by material Manufacturer. Do not apply air barrier to a damp or wet substrate.

B. Field Conditions: Do not install air barrier in snow, rain, fog, or mist. Do not install air barrier when the temperature of substrate surfaces and surrounding air temperatures are below those recommended by the Manufacturer.

C. Sequencing: Do not install air barrier material before the roof assembly has been sufficiently installed to prevent a buildup of water in the interior of the building.

D. Compatibility: Do not allow air barrier materials to come in contact with chemically incompatible materials.

E. Ultra-violet exposure: Do not expose air barrier materials to sunlight longer than as recommended by the material Manufacturer.

1.9 WARRANTY

A. Material Warranty: Provide Manufacturer’s standard product warranty, for a minimum 20 years from date of Substantial Completion.

B. Subcontractor (approved by ABAA and Manufacturer) Installation Warranty: Provide a five (5) year installation warranty from date of Substantial Completion, including all accessories and materials of the air barrier assembly, against failures including loss of airtight seal, loss of watertight seal, loss of attachment, loss of adhesion and failure to cure properly.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fluid Applied Membrane Air Barrier: Use regular, high temperature or low-temperature formulation depending on site conditions, within temperature ranges specified by Manufacturer. Subject to compliance with requirements, provide one of the following:

1. BASF Corporation: MasterSeal AWB 660, Enershield HP, Finestop RA, Senershield R, Acrostop R and Sonowall FT R. Thickness for products are as specified by Manufacturer. www.wallsystems.basf.com:

   a. AIR BARRIER MATERIAL PROPERTIES:

      1) Air permeance for this material has been tested and reported as being 0.0000 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.0000 cfm/ft^2 @ 1.57 psf), at 10 mils (wet) when tested in accordance with ASTM E2178 (unmodified).
      2) Water vapor permeance for this material has been tested and reported as being 1004 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (1004 ng/(Pa·s·m^2) / 17.6 US perms) at 10 mils (wet) when tested in accordance with ASTM E96 (water method – unmodified).

   b. AIR BARRIER ACCESSORY MATERIALS:

      1) Fabric Reinforcement: Sheathing fabric to be saturated with BASF Fluid-Applied Membrane for use at sheathing joints, penetrations and window rough openings.
      2) Flashing and Transition Membrane: WS Wrap polyester-faced 30-mil self-adhesive membrane or WS Membrane 20-mil self-adhesive membrane.
      3) Water-based Primer for Self-Adhesive Membranes: WS Flashing Primer.
      4) Mastics: As recommended by Manufacturer.

2. Carlisle Coatings and Waterproofing: Fire-Resist Barritech VP at 60 mils thick (wet). www.carlisle-ccw.com:

   a. AIR BARRIER MATERIAL PROPERTIES:

      1) Air permeance for this material has been tested and reported as being 0.0002 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.0002 cfm/ft^2 @ 1.57 psf), at 65 mils (wet), when tested in accordance with ASTM E2178 (unmodified).
      2) Water vapor permeance for this material has been tested and reported as being 817 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (817 ng/(Pa·s·m^2) / 14.295 US perms) at 60 mils (wet) [40 mils (dry)] when tested in accordance with ASTM E96 (water method – unmodified).

   b. AIR BARRIER ACCESSORY MATERIALS:

      1) Detail Flashing: Fire-Resist 705 FR.
      2) Counter-flashing for Metal Wall Flashings: Fire-Resist 705 FR.
      3) Water-Based Primer for Detail Flashing: CCW-702 WB.
      4) Solvent-Based Primer for Detail Flashing: CCW-702 or CCW-702 LV.
      5) Solvent-Based Aerosol Primer for Detail Flashing: CAV-GRIP.
      6) Reinforcing Fabric: DCH Reinforcing Fabric.
      7) Glass Mat: LiquiFiber-W.
      8) Termination Mastic: SURE-SEAL Lap Sealant.
      9) Fill Compound: CCW-201 or CCW-703 V.

3. Dow Corning: DefendAir 200 at 15 mils thick (dry). www.buildabetterbarrier.com:

   a. AIR BARRIER MATERIAL PROPERTIES:

      1) Air permeance for this material has been tested and reported as being 0.0010 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.0010 cfm/ft2 @ 1.57 psf), [0.0049 liters per square meter per second under a pressure differential of 75 Pa (0.0049 L/(s·m2) @ 75 Pa)] at 15 mils (dry), when tested in accordance with ASTM E2178 (unmodified).
      2) Water vapor permeance for this material has been tested and reported as being 1387.7 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (1387.7 ng/(Pa·s·m2) [24.26 US perms] at 15 mils (dry) when tested in accordance with ASTM E96 (water method – unmodified).

   b. AIR BARRIER ACCESSORY MATERIALS:
      1) Solvent-Based Primer: Dow Corning® DefendAir Primer
      2) Sealants: Dow Corning® 791 Silicone Weatherseal Sealant, Dow Corning® 756 SMS Silicone Sealant, Dow Corning® 795 Silicone Building Sealant, Dow Corning® 758 Silicone Weather Barrier Sealant
      3) Transition Membrane for details and terminations: Dow Corning® 778, Dow Corning® Silicone Transition Strip
      4) Flashing at Transition Membrane: Dow Corning® Silicone Transition Strip
      5) Counterflashing for Through-Wall Flashings: Dow Corning® Silicone Transition Strip
      6) Through-Wall Flashings or Shelf Angle Flashings: Dow Corning® 778 below the flexible through wall flashing system.
      7) Substrate Joint Treatment: Dow Corning® 791 Silicone Weatherseal Sealant

4. Dryvit Systems, Inc: Backstop NT at 12mils thick (dry). www.dryvit.com:

   a. AIR BARRIER MATERIAL PROPERTIES:

      1) Air permeance for this material has been tested and reported as being 0.000118 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.000118 cfm/ft2 @ 1.57 psf), [0.0006 liters per square meter per second under a pressure differential of 75 Pa (0.0006 L/(s·m2) @ 75 Pa)] at 12 mils (dry), when tested in accordance with ASTM E2178 (unmodified).
      2) Water vapor permeance for this material has been tested and reported as being 1810 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (1810 ng/(Pa·s·m2) [31.65 US perms] at 20 mils (dry) when tested in accordance with ASTM E96 (water method – unmodified).

   b. AIR BARRIER ACCESSORY MATERIALS:

      1) Transition Membrane for details and terminations: Dryvit AquaFlash and AquaFlash Mesh
      2) Reinforcing / Joint Tape: Dryvit Grid Tape
      3) Flashing at Transition Membrane: Dryvit AquaFlash
      4) Substrate Joint Treatment: Dryvit Grid Tape with Backstop NT

5. DuPont Building Innovations: Tyvek Fluid Applied WB at 25 mils thick (wet), 25 mils thick (dry). www.Weatherization.Tyvek.com:

a. AIR BARRIER MATERIAL PROPERTIES:

1) Air permeance for this material has been tested and reported as being 0.0002 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.0002 cfm/ft^2 @ 1.57 psf), at 25 mils (dry), when tested in accordance with ASTM E2178 (unmodified).
2) Water vapor permeance for this material has been tested and reported as being 1384 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (1384 ng/(Pa·s·m^2) / 24.23 US perms) at 25 mils (dry) when tested in accordance with ASTM E96 (water method – unmodified).

b. AIR BARRIER ACCESSORY MATERIALS:

1) Solvent Based Primer for Flashing, Transition Strip and Detail Membranes: 3M High Strength 90; Denso Butyl (used with self-adhered membranes only).
2) Through-Wall Flashings or Shelf Angle Flashings: DuPont recommended through-wall flashing.
3) Sealants, Mastics, Adhesives and Tapes: DuPont Sealant for Tyvek Fluid Applied System; DuPont Tyvek Flashing and Joint Compound; fiberglass mesh tape.
4) Transition, Termination, and Detailing Membrane: DuPont StraightFlash, or DuPont Tyvek Flashing and Joint Compound (60mil).
5) Penetrations and Termination Sealant: DuPont Sealant for Tyvek Fluid Applied System.
6) Window Flashing Membrane: DuPont Tyvek Fluid Applied Flashing and Joint Compound, or DuPont Tyvek Fluid Applied Flashing – Brush Formulation, or DuPont StraightFlash with DuPont FlexWrap.
7) Joint Treatment: None (≤ 1/16” gaps); DuPont Tyvek Flashing and Joint Compound (≤ 1/4” gaps); DuPont Tyvek Flashing and Joint Compound w/ fiberglass mesh tape (≤ 1/2” gaps); DuPont StraightFlash (≤ 1” gaps).

6. Grace Construction Products: Perm-A-Barrier VP, 90 mils thick (wet), 45 mils thick (dry). www.na.graceconstruction.com:

a. AIR BARRIER MATERIAL PROPERTIES:

1) Air permeance for this material has been tested and reported as being 0.0004 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.0004 cfm/ft^2 @ 1.57 psf), at 69 mils (wet), when tested in accordance with ASTM E2178 (unmodified).
2) Water vapor permeance for this material has been tested and reported as being 741.6 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (741.6 ng/(Pa·s·m^2) / 12.9 US perms) at 40 mils (dry) when tested in accordance with ASTM E96 (water method – unmodified).

b. AIR BARRIER ACCESSORY MATERIALS:

1) Membrane for details and Terminations: Bituthene Liquid Membrane.
2) Water-Based Primer for Flashing, Transition Strip and Detail Membrane: Perm-A-Barrier WB Primer or Perm-A-Barrier Primer Plus.
3) Solvent-Based Primer for Flashing, Transition Strip and Detail Membrane: Bituthene Primer B-2 and Bituthene Primer B2 LVC or Bituthene Primer B2.
4) Through-Wall Flashings or Shelf Angle Flashings: Perm-A-Barrier Wall Flashing below the flexible through wall flashing system.

5) Sealants, Mastics, Adhesives and Tapes: As recommended by Grace Construction Products.
6) Transition Membrane: Perm-A-Barrier Detail Membrane, Perm-A-Barrier Aluminum Flashing and Perm-A-Barrier Wall Flashing.
7) Penetrations and Termination Sealant: Bituthene Liquid Membrane and as recommended by Grace Construction Products.
8) Window Flashing and Detail Membrane: Perm-A-Barrier Detail Membrane, Perm-A-Barrier Aluminum Flashing and Perm-A-Barrier Wall Flashing.
9) Joint Sealant: Refer to Technical Letter 1 for details on compatible waterproofing sealants.

7. Henry Company: Air Bloc 17MR at 48 mils (wet) - *Medium build option*. www.henry.com:

a. AIR BARRIER MATERIAL PROPERTIES:

1) Air permeance for this material has been tested and reported as being 0.00024 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.0001 cfm/ft^2 @ 1.57 psf), at 48 mils (wet) when tested in accordance with ASTM E2178 (unmodified).
2) Water vapor permeance for this material has been tested and reported as being 28 US perms at 25 mils (dry) when tested in accordance with ASTM E96 (water method – unmodified).

b. AIR BARRIER ACCESSORY MATERIALS:

1) Liquid Applied Flashing: Air-Bloc LF.
2) Transition Membrane: Blueskin SA and Blueskin SALT for low-temperature applications.
3) Sheathing Joint Membrane: Blueskin VP160.
4) Spray Adhesive: Blueskin Adhesive and Blueskin LVC Adhesive.
5) Water-Based Primer for Transition Membrane: Aquatac Primer.
6) Counterflashing for Metal Panel Through-Wall Flashing: Blueskin TWF.
7) Sealant: HE 925 BES Sealant.
8) Reinforcing Tape: HE 183 Yellow Glass Fabric.
9) Insulation Adhesive: Air-Bloc 21.

8. Henry Company: Air Bloc 17MR at 70 mils (wet) - *Standard build option*. www.henry.com:

a. AIR BARRIER MATERIAL PROPERTIES:

1) Air permeance for this material has been tested and reported as being 0.00024 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.0001 cfm/ft2 @ 1.57 psf), at 70 mils (wet) when tested in accordance with ASTM E2178 (unmodified).
2) Water vapor permeance for this material has been tested and reported as being 14 US perms at 37 mils (dry) when tested in accordance with ASTM E96 (water method – unmodified).

b. AIR BARRIER ACCESSORY MATERIALS:

1) Liquid Applied Flashing: Air-Bloc LF.
2) Transition Membrane: Blueskin SA and Blueskin SALT for low-temperature applications.
3) Sheathing Joint Membrane: Blueskin VP160.

4) Spray Adhesive: Blueskin Spray Prep and Blueskin Adhesive and Blueskin LVC Adhesive.
5) Water-Based Primer for Transition Membrane: Aquatac Primer.
6) Counterflashing for Metal Panel Through-Wall Flashing: Blueskin TWF.
7) Sealant: HE 925 BES Sealant.
8) Reinforcing Tape: HE 183 Yellow Glass Fabric.
9) Insulation Adhesive: Air-Bloc 21.

9. Henry Company: Air Bloc 31 MR at 90 mils (wet). www.henry.com:

a. AIR BARRIER MATERIAL PROPERTIES:

1) Air permeance for this material has been tested and reported as being 0.00024 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.00024 cfm/ft2 @ 1.57 psf), at 87 mils (wet) when tested in accordance with ASTM E2178 (unmodified).
2) Water vapor permeance for this material has been tested and reported as being 2066 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (2066 ng/(Pa·s·m^2) / 36.12 US perms) at 44 mils (dry) when tested in accordance with ASTM E96 (water method – unmodified).

b. AIR BARRIER ACCESSORY MATERIALS:

1) Transition Membrane: Blueskin SA and Blueskin SALT for low-temperature applications.
2) Water-Based Primer for Transition Membrane: Aquatac Primer.
3) Solvent-Based Primer for Transition Membrane: Blueskin Adhesive.
4) Solvent-Based Aerosol Primer for Transition Membrane: Blueskin Spray Prep.
5) Counter-flashing for Metal Panel Through-Wall Flashing: Blueskin TWF.
6) Sealant: HE 925 BES Sealant.
7) Reinforcing Tape: HE 183 Yellow Glass Fabric.
8) Mastics, Adhesives and Tapes: Henry 570-05 Polybitume.

10. Henry Company: Air Bloc 33 MR at 100 mils (wet), 58 mils thick (dry). www.henry.com:

a. AIR BARRIER MATERIAL PROPERTIES:

1) Air permeance for this material has been tested and reported as being 0.0016 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.0016 cfm/ft^2 @ 1.57 psf), when tested in accordance with ASTM E 2178 (unmodified).
2) Water vapor permeance for this material has been tested and reported as being 652 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (652 ng/(Pa·s·m^2) / 11.4 US perms) at 59 mils (dry) when tested in accordance with ASTM E96 (water method – unmodified).

b. AIR BARRIER ACCESSORY MATERIALS:

1) Transition Membrane: Blueskin SA and Blueskin SALT for low-temperature applications.
2) Water-Based Primer for Transition Membrane: Aquatec Primer.
3) Solvent-Based Primer for Transition Membrane: Blueskin Adhesive.
4) Solvent-Based Aerosol Primer for Transition Membrane: Blueskin Spray Prep.
5) Counter-flashing for Metal Panel Through-Wall Flashing: Blueskin TWF.

6) Sealant: HE 925 BES Sealant.
7) Reinforcing Tape: HE 183 Yellow Glass Fabric.
8) Mastics, Adhesives and Tapes: Henry 570-05 Polybitume.

11. Momentive Performance Materials, Inc.: GE Elemax 2600 at 17 mils (dry). www.ge.com/silicones:

a. AIR BARRIER MATERIAL PROPERTIES:

1) Air permeance for this material has been tested and reported as being 0.0006 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.0006 cfm/ft^2 @ 1.57 psf), at 17 mils (dry) when tested in accordance with ASTM E2178 (unmodified).
2) Water vapor permeance for this material has been tested and reported as being 581 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (581 ng/(Pa·s·m^2) / 10.16 US perms) at 17 mils (dry) when tested in accordance with ASTM E96 (water method – unmodified).

b. AIR BARRIER ACCESSORY MATERIALS:

1) Solvent-Based Primer: SS80.
2) Sealants: Elemax 5000 Liquid Flashing; SilPruf SCS2000; SilPruf SCS9000; SilPruf SCS2700; SWS.
3) Transition Membrane for details and terminations: Elemax 5000 Liquid Flashing; UltraSpan UST2200; UltraSpan USM pre-formed silicone molded corners parts.
4) Substrate Joint Treatment: Elemax 5000 Liquid Flashing; SilPruf SCS2000; SilPruf SCS9000; SilPruf SCS2700; SWS.
5) Reinforcing Fabric: RF100.

12. Pecora USA: Pecora XL-Perm ULTRA VP by Pecora USA at 9 – 12 mils (dry). www.pecora.com:

a. AIR BARRIER MATERIAL PROPERTIES:

1) Air permeance for this material has been tested and reported as being 0.00024 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.00024 cfm/ft^2 @ 1.57 psf), 0.0012 liters per square meter per second under a pressure differential of 75 Pa (0.0012 L/(s·m^2) @ 75 Pa)] at 12 mils (dry) when tested in accordance with ASTM E2178 (unmodified).
2) Water vapor permeance for this material has been tested and reported as being 727.01 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (727.01 ng/(Pa·s·m2) (12.71 US perms) at 9 mils - dry when tested in accordance with ASTM E96 (water method – unmodified).

b. AIR BARRIER ACCESSORY MATERIALS:

1) Sealants: 890NST Silicone Sealant, AVB Silicone Sealant
2) Transition Membrane for details and terminations: XL Span
3) Flashing at Transition Membranes: XL Flash Liquid Flashing & Joint Filler
4) Counter-Flashing for Through-Wall Flashings: XL Flash Liquid Flashing & Joint Filler with Flexible Flashing.
5) Through-Wall Flashings or Shelf Angle Flashings: XL Flash Liquid Flashing & Joint Filler below the flexible through wall flashing system.

6) Substrate Joint Treatment: XL Flash Liquid Flashing & Joint Filler, 890 NST Silicone Sealant, AC-20 Latex Sealant, AVW-920 Latex Sealant, Dynatrol I-XL-345 Tru White STPU Sealant

13. PROSOCO, Inc.: Spray Wrap MVP at 10 mils (wet). www.prosoco.com:

a. AIR BARRIER MATERIAL PROPERTIES:

1) Air permeance for this material has been tested and reported as being 0.00086 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.00086 cfm/ft^2 @ 1.57 psf), when tested in accordance with ASTM E2178 (unmodified).
2) Water vapor permeance for this material has been tested and reported as being 1430 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (1430 ng/(Pa·s·m^2) / 25 US perms) at 10 mils (wet) when tested in accordance with ASTM E96 (water method – unmodified).

b. AIR BARRIER ACCESSORY MATERIALS:

1) Water-Based Primer: PROSOCO R-GUARD PorousPrep for cut gyp board edged in rough openings.
2) Sealants: PROSOCO R-GUARD AirDam for interior perimeter seal in window installations.
3) Transition Membrane for details and terminations: PROSOCO R-GUARD SureSpan EX
4) Flashing at Transition Membrane: PROSOCO R-GUARD FastFlash
5) Counter-flashing for Through-Wall Flashings: Combination of PROSOCO R-GUARD Joint & Seam Filler and PROSOCO R-GUARD FastFlash or FastFlash alone as a fill and flashing product.
6) Through-Wall Flashings or Shelf Angle Flashings: Combination of PROSOCO R-GUARD Joint & Seam Filler and PROSOCO R-GUARD FastFlash or FastFlash alone as a fill product and flashing below the flexible through wall flashing system.
7) Substrate Joint Treatment: PROSOCO R-GUARD FastFlash and / or PROSOCO R-GUARD Joint & Seam Filler.
8) Rough Openings: PROSOCO R-GUARD Joint and Seam Filler followed by PROSOCO R-GUARD FastFlash.

14. PROSOCO, Inc.: Cat 5 at 12 - 15 mils (wet). www.prosoco.com:

a. AIR BARRIER MATERIAL PROPERTIES:

1) Air permeance for this material has been tested and reported as being 0.00018 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.00018 cfm/ft^2 @ 1.57 psf), when tested in accordance with ASTM E2178 (unmodified).
2) Water vapor permeance for this material has been tested and reported as being 1015 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (1015 ng/(Pa·s·m^2) / 17.71 US perms) at 12 – 15 mils (wet) when tested in accordance with ASTM E96 (water method – unmodified).

b. AIR BARRIER ACCESSORY MATERIALS:

1) Water-Based Primer: PROSOCO R-GUARD GypPrime for cut gyp board edged in rough openings.
2) Sealants: PROSOCO R-GUARD AirDam for interior perimeter seal in window installations.
3) Counter-flashing for Through-Wall Flashings: PROSOCO R-GUARD Joint and Seam Filler followed by PROSOCO R-GUARD FastFlash.
4) Through-Wall Flashings or Shelf Angle Flashings: PROSOCO R-GUARD Joint and Seam Filler followed by PROSOCO R-GUARD FastFlash below the flexible through wall flashing system.
5) Substrate Joint Treatment: PROSOCO R-GUARD Joint & Seam Filler for sheathing seams, PROSOCO R-GUARD Joint & Seam Filler covered by PROSOCO R-GUARD FastFlash in rough opening.

15. Protecto Wrap: Protecto Wall Liquid Air Barrier VP by at 10 mils (dry). www.protectowrap.com:

a. AIR BARRIER MATERIAL PROPERTIES:

1) Air permeance for this material has been tested and reported as being 0.00086 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.000864 cfm/ft2 @ 1.57 psf), 0.0043 liters per square meter per second under a pressure differential of 75 Pa (0.0043 L/(s·m2) @ 75 Pa)] at 10 mils (dry) when tested in accordance with ASTM E2178 (unmodified).
2) Water vapor permeance for this material has been tested and reported as being 660.8 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (660.8 ng/(Pa·s·m^2) [11.5 US perms] at 22 mils (dry) when tested in accordance with ASTM E96 (water method – unmodified).

b. AIR BARRIER ACCESSORY MATERIALS:

1) Water-Based Primer: Universal Water Based Primer.
2) Solvent-Based Primer: BT Primer.
3) Solvent-Based Aerosol Primer: Protecto-Tak Spray Adhesive.
4) Sealants: Protecto Wall Board to Baord Joint Sealant.
5) Transition Membrane for details and terminations: Protecto Wall Transition Tape.
6) Solvent-Based Primer for Flashing, Transition Strip and Detail Membrane: BT Primer.
7) Water-Based Primer for Flashing, Transition Strip and Detail Membrane: Universal Water Based Primer.
8) Substrate Joint Treatment: Protecto Wall Board to Board Joint Sealant.

16. Sika Corporation: Sikagard 530 Liquid Applied Vapor Permeable Air Barrier at 30 mils (dry). www.sika.com:

a. AIR BARRIER MATERIAL PROPERTIES:

1) Air permeance for this material has been tested and reported as being < 0.0001 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (< 0.0001 cfm/ft^2 @ 1.57 psf), at 20 mils (dry) when tested in accordance with ASTM E2178 (unmodified).
2) Water vapor permeance for this material has been tested and reported as being 661 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (661 ng/(Pa·s·m^2) / 11.5

US perms) at 22 mils (dry) when tested in accordance with ASTM E96 (water method – unmodified).

b. AIR BARRIER ACCESSORY MATERIALS:

1) Water-Based Primer: Sikagard 530.
2) Solvent-Based Primer: Sikagard 510.
3) Termination Mastic: Sikaflex 11FC.
4) Sealants: Sikaflex 11FC.
5) Transition Membrane for details and terminations: SikaMultiSeal 515.
6) Reinforcing/Joint Tape: SikaMultiSeal 515.
7) Counterflashing for Through-Wall Flashings: SikaMultiSeal Plus with Flexible Flashing.
8) Through-Wall Flashings or Shelf Angle Flashings: SikaMultiSeal Plus below the flexible through wall flashing system.
9) Substrate Joint Treatment: Sikaflex 11FC.

17. Soproma: Sopraseal LM 202 VP at 10 mils (wet) www.soprema.us

a. AIR BARRIER MATERIAL PROPERTIES:

1) Air permeance for this material has been tested and reported as being 0.00004 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.00004 cfm/ft2 @ 1.57 psf), [0.0002 liters per square meter per second under a pressure differential of 75 Pa (0.0002 L/(s·m2) @ 75 Pa)] at 10 mils (wet) when tested in accordance with ASTM E 2178 (unmodified).
2) Water vapor permeance for this material has been tested and reported as being 1004 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (1004 ng/(Pa·s·m^2) [17.6 US perms] at 10 mils (wet) when tested in accordance with ASTM E96 (water method – unmodified).

b. AIR BARRIER ACCESSORY MATERIALS:

1) Water Based Primer: Soprema Elastocol Stick H20 Primer
2) Solvent-Based Primer: Soprema Sopraseal Stick primer
3) Sealants: Soprema Sopraseal sealant
4) Transition Membrane for details and terminations: Soprema Sopreseal Stick 1100T or Soprema Soprsolin HD
5) Substrate Joint Treatment: Soprema Sopreseal Mesh

18. Sto Corp: Emerald Coat at 20 mils (dry). www.stocorp.com:

a. AIR BARRIER MATERIAL PROPERTIES:

1) Air permeance for this material has been tested and reported as being 0.000024 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.00024 cfm/ft^2 @ 1.57 psf), [0.00020 liters per square meter per second under a pressure differential of 75 Pa (0.00020 L/(s·m^2) @ 75 Pa)] at 20 mils (dry) when tested in accordance with ASTM E2178 (unmodified).
2) Water vapor permeance for this material has been tested and reported as being 797.94 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (797.94 ng/(Pa·s·m^2) [13.95 US perms] at 12 mils (dry) when tested in accordance with ASTM E96 (water method – unmodified).

b. AIR BARRIER ACCESSORY MATERIALS:

1) Joint and Rough Opening Treatments: Sto Gold Fill with StoGuard Mesh, StoGuard Rapid Seal with StoGuard Mesh, Sto EmeraldCoat with SToGuard Fabric, StoGuard Tape
2) Joint Reinforcements: StoGuard Mesh, StoGuard Fabric, StoGuard RediCorner
3) Transition Membranes: Sto Gold Fill with StoGuard Mesh, StoGuard RapidSeal or StoGuard RapidSeal with StoGuard Mesh, Sto Emerald Cost with StoGuard Fabric, StoGuard Tape
4) Water-Based Primer for use with Flashing Transition: StoGuard

19. STS Coatings: Wall Guardian FW-100-A (Acrylic-based component) 40 mils (wet), 20 mils (dry). www.wallguardian.com:

a. AIR BARRIER MATERIAL PROPERTIES:

1) Air permeance for this material has been tested and reported as being 0.0001 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.0001 cfm/ft^2 @ 1.57 psf), at 20 mils (dry) when tested in accordance with ASTM E2178 (unmodified).
2) Water vapor permeance for this material has been tested and reported as being 661 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (661 ng/(Pa·s·m^2) / 11.5 US perms) at 22 mils (dry) when tested in accordance with ASTM E96 (water method – unmodified).

b. AIR BARRIER ACCESSORY MATERIALS:

1) Water-Based Primer for Flashing, Transition Strip and Detail Membrane: None.
2) Solvent-Based Primer for Flashing, Transition Strip and Detail Membrane: BP-40 Primer for use with UT-40 Universal Tape.
3) Through-Wall Flashings or Shelf Angle Flashings: Gorilla Flash VF-1000.
4) Mastics: None.
5) Adhesives and Tapes: Universal Tape UT-40, a butyl based tape and Great Seal LT-100, a low voc elastomeric sealant for deflection joints and details.
6) Transition Strip: Universal Tape, UT-40.
7) Termination Mastic: Great Seal LT-100.
8) Window Flashing and Detail Membrane: Universal Tape UT-40.

20. TK Products: TK-AirMax 2103 at 40+ mils (wet). www.tkproducts.com:

a. AIR BARRIER MATERIAL PROPERTIES:

1) Air permeance for this material has been tested and reported as being 0.00097 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.00097 cfm/ft^2 @ 1.57 psf), 0.00492 liters per square meter per second under a pressure differential of 75 Pa (0.00492 L/(s·m^2) @ 75 Pa)] at 40 mils (wet) when tested in accordance with ASTM E2178 (unmodified).
2) Water vapor permeance for this material has been tested and reported as being 857 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (857 ng/(Pa·s·m^2) [15.0 US perms] at 20 mils (dry) when tested in accordance with ASTM E96 (water method – unmodified).

b. AIR BARRIER ACCESSORY MATERIALS:

1) Through-Wall Flashings or Shelf Angle Flashings: TK-Climate Flash, TK-Butyl Bond, TK-SS Flashing, TK-TWF-18 below the flexible through wall flashing system.
2) Caulk: TK-Super Seal
3) Adhesives and Tapes: TK-AirMax 2200 All Weather Flashing (TK Products), TK Air Max 2203 Caulk, TK-AirMax 2201 Red Sheathing Facing Tape (Venture Tape, a 3M Company), 3M All-Weather Flashing Tape 8067 (3M Company), VentureStop VB 400 (Venture Tape, a 3M Company), Venture-1585 CW-2 Red Sheating Facing Tape (Venture Tape, a 3M Company)
4) Transition Membranes: TK-Climate Flash, TK-Butyl Bond, TK-SS Flashing, TK-TWF-18
5) Reinforcing / Joint Tape: TK-Climate Flash, TK-Butyl Bond, TK-SS Flashing, TK-TWF-18
6) Termination of Caulk: TK-AirMax Caulk 2203 (TK Products), Manus-Bond 75AM (Manus Products, Inc.)
7) Flashing (Counter) for at Through-Wall Flashings or Transition Membranes: TK-Climate Flash, TK-Butyl Bond, TK-SS Flashing, TK-TWF-18

21. TK Products: TK-AirMax 2104 at 40+ mils (wet). www.tkproducts.com:

a. AIR BARRIER MATERIAL PROPERTIES:

1) Air permeance for this material has been tested and reported as being 0.0008 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.0008 cfm/ft^2 @ 1.57 psf), at 40+ mils (wet) when tested in accordance with ASTM E2178 (unmodified).
2) Water vapor permeance for this material has been tested and reported as being 1007 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (1007 ng/(Pa·s·m^2) / 17.6 US perms) at 14 mils (dry) when tested in accordance with ASTM E96 (water method – unmodified).

b. AIR BARRIER ACCESSORY MATERIALS:

1) Through-Wall Flashings or Shelf Angle Flashings: TK-Climate Flash, TK-Butyl Bond, TK-SS Flashing, TK-TWF-18 below the flexible through wall flashing system.
2) Caulk: TK-Super Seal.
3) Adhesives and Tapes: TK-AirMax 2200 All Weather Flashing (TK Products), TK Air Max 2203 Caulk, TK-AirMax 2201 Red Sheathing Facing Tape (Venture Tape, a 3M Company), 3M All-Weather Flashing Tape 8067 (3M Company), VentureStop VB 400 (Venture Tape, a 3M Company), Venture-1585 CW-2 Red Sheating Facing Tape (Venture Tape, a 3M Company).
4) Transition Membranes: TK-Climate Flash, TK-Butyl Bond, TK-SS Flashing, TK-TWF-18.
5) Reinforcing / Joint Tape: TK-Climate Flash, TK-Butyl Bond, TK-SS Flashing, TK-TWF-18.
6) Termination of Caulk: TK-AirMax Caulk 2203 (TK Products), Manus-Bond 75AM (Manus Products, Inc.)
7) Flashing (Counter) for at Through-Wall Flashings or Transition Membranes: TK-Climate Flash, TK-Butyl Bond, TK-SS Flashing, TK-TWF-18.

22. Tremco, Inc.: ExoAir 230 at 40 mils (wet) www.tremcosealants.com

a. AIR BARRIER MATERIAL PROPERTIES:

1) Air permeance for this material has been tested and reported as being 0.0003 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.0003 cfm/ft^2 @ 1.57 psf), at 40 mils (wet) when tested in accordance with ASTM E2178 (unmodified).
2) Water vapor permeance for this material has been tested and reported as being 1677 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (1677 ng/(Pa·s·m^2) at 29 mils (dry) when tested in accordance with ASTM E 96 (water method – unmodified).

b. AIR BARRIER ACCESSORY MATERIALS:

1) Solvent Based Primer: ExoAir Primer
2) Termination Mastic: ExoAir Termiantion Mastic
3) Sealants: Tremflex 834, Dymonic 100, Spectrem 1
4) Transition Membrane for Details and Terminations: ExoAir 110, ExoAir 111, ExoAir TWF, Dymonic 100
5) Reinforcing / Joint Tape: Tremco 2011 mesh
6) Flashing at Transition Membrane: ExoAir 111, ExoAir TWF, Dymonic 100
7) Counterflashing for Through Wall Flashings: ExoAir TWF
8) Through Wall Flashings or Shelf Angle Flashings: ExoAir TWF below the flexible through wall flashing system.
9) Solvent Based Primer for Flashing, Transition Strip and Detail Membrane: ExoAir Primer
10) Substrate Joint Treatment: Tremflex 834, Dymonic 100 depending on substrate.

23. W.R. Meadows, Inc.: Air-Shield LMP, at 60 mils (wet), 30 mils (dry). www.wrmeadows.com:

a. AIR BARRIER MATERIAL PROPERTIES:

1) Air permeance for this material has been tested and reported as being 0.000096 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.000096 cfm/ft2 @ 1.57 psf), [0.00048 liters per square meter per second under a pressure differential of 75 Pa (0.00048 L/(s·m2) @ 75 Pa)] at 20 mils (dry) when tested in accordance with ASTM E2178 (unmodified).
2) Water vapor permeance for this material has been tested and reported as being 598 nanograms of water vapor passing through each square meter of area per second for each Pascal of vapor pressure differential (598 ng/(Pa·s·m^2) [10.47 US perms] at 30 mils (dry) when tested in accordance with ASTM E 96 (water method – unmodified).

b. AIR BARRIER ACCESSORY MATERIALS:

1) Water-Based Primer: None required for Air Shield LMP.
2) Solvent-Based Primer: None required for Air Shield LMP.
3) Solvent-Based Aerosol Primer: None required for Air Shield LMP.
4) Termination Mastic: Pointing Mastic or BEM.
5) Transition Membrane for details and terminations: Air Shield.
6) Reinforcing / Joint Tape: Reinforcing Fabric HCR.
7) Flashing at Transition Membrane: Air Shield Thru-Wall Flashing.
8) Counter-flashing for Through-Wall Flashings: Air Shield Thru-Wall Flashing.
9) Through-Wall Flashings or Shelf Angle Flashings: Air Shield Thru-Wall Flashing below the flexible through wall flashing system.
10) Solvent-Based Primer for Flashing, Transition Strip and Detail Membrane: Mel-Prime VOC.

11) Water-Based Primer for Flashing, Transition Strip and Detail Membrane: Mel-Prime WB.
12) Substrate Joint Treatment: Air Shield Joint Filler.

2.2 AUXILIARY MATERIALS

A. Transition Membrane Between Air and Vapor Barrier Membrane and Roofing and Other Adjacent Materials: Comply with both air barrier Manufacturer's recommendations and roofing material Manufacturer's recommendations.

B. Provide primers, glass fabric scrim tape, mastic, and other materials not specifically described, but required for a complete and proper installation as instructed by the air barrier system Manufacturer or required to provide a continuous the air barrier assembly.

PART 3 - EXECUTION

3.1 EXAMINATION

A. The ABAA Certified Air Barrier Contractor shall examine substrates, areas, and conditions under which the air barrier assembly will be installed, with ABAA Certified Installer present, for compliance with requirements.

1. Confirm site access logistics and scheduling requirements, including but not limited to use of scaffolding, lifts and staging.
2. Verify that surfaces and conditions are suitable prior to commencing work of this section. Do not proceed with installation until unsatisfactory conditions have been corrected.
3. Ensure that the following conditions are met:
   a. Surfaces are sound, dry, even, and excess mortar and / or other contaminants.
   b. Inspect and confirm substrates to be smooth and without large voids or sharp protrusions. Inform General Contractor if substrates are not acceptable and need to be repaired by the substrate Subcontractor.
   c. Inspect and confirm masonry joints to be reasonably flush and completely filled, and ensure all excess mortar accumulated on masonry ties has been removed. Inform General Contractor if masonry joints are not acceptable and need to be repaired by the masonry Subcontractor.
   d. Masonry joints are flush and completely filled with mortar, and all excess mortar sitting on masonry ties has been removed.
4. Verify substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263 and take suitable measures until substrate passes moisture test.
5. Verify sealants are compatible with membrane proposed for use. Perform field peel-adhesion test on materials to which sealants are adhered.
6. Notify Architect in writing of anticipated problems using air and vapor barrier over substrate prior to proceeding.

3.2 SURFACE PREPARATION

A. Clean, prepare, and treat substrate according to material Manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air barrier application.

1. Ensure that penetrating work by other trades is in place and complete.
2. Prepare surfaces by brushing, scrubbing, scraping, grinding or compressed air to remove loose mortar, dust, oil, grease, oxidation, mill scale and other contaminants which will affect adhesion of the fluid-applied membrane.
3. Wipe down metal surfaces to remove release agents or other non-compatible coatings using clean sponges or with a material chemically compatible with the primary air material.

B. Prime substrate for installation of sheet membrane transition strips as recommended by material Manufacturer and as follows:

1. Prime masonry, concrete substrates with conditioning primers.
2. Prime glass-fiber surfaced gypsum sheathing an adequate number of coats to achieve required bond, with adequate drying time between coats.
3. Prime wood, metal, and painted substrates with primer.
4. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through air barrier at protrusions.

C. Prime substrate for installation of fluid-applied air barrier if recommended by material Manufacturer based on project conditions.

D. Protection from spray-applied materials as recommended by material Manufacturer and as follows:

1. Mask and cover adjacent areas to protect from over-spray.
2. Ensure any required foam stop or back up materials are in place to prevent over-spray and achieve complete seal.

3.3 INSTALLATION

A. Fluid Applied Membrane Air Barrier: Install air barrier accessories and fluid-applied membrane air barrier material to provide continuity throughout the building envelope in a shingle fashion. Install materials in accordance with material Manufacturer's instructions and the following (unless Manufacturer recommends other procedures in writing based on project conditions or particular requirements of their recommended materials):

1. Install veneer anchors as per air barrier Manufacturer installation sequencing.
2. Apply treatment to exterior gypsum joints and screw heads as per air barrier material Manufacturer.
3. Apply primer for transition material at the rate instructed by the air barrier material Manufacturer for 1 inch beyond terminating edge of transition membrane. Allow primer to set / cure completely before transition strip application.
4. Position subsequent sheets of transition material so that membrane overlaps the membrane sheet below by a minimum of 2 inches, unless greater overlap is recommended by the material Manufacturer. Ensure transition membrane is securely sealed onto substrate with roller.
5. Overlap horizontally adjacent pieces of transition material a minimum of 2 inches, unless greater overlap is recommended by the material Manufacturer. Roll all areas of transition strip including seams with roller.
6. Seal around all penetrations with termination mastic / sealant, membrane counterflashing or other procedure in accordance with material Manufacturer’s instructions, ensuring chemical compatibility amongst adjoining materials.
7. Connect air barrier in exterior wall assembly continuously to the air barrier of the roof, to concrete below-grade structures, to windows, curtain wall, storefront, louvers, exterior doors, other intersection conditions and transitions from wet cavity to dry cavity and seal penetrations using accessory materials in accordance with the material Manufacturer’s instructions.
8. Provide transition material at changes in substrate plane (with bead of sealant / mastic, membrane counter-flashing or other material recommended by material Manufacturer) under membrane to eliminate all sharp 90 degree inside corners and to make a smooth transition from one plane to another.
9. Provide mechanically fastened non-corrosive metal sheet or other Manufacturer approved transition material to span gaps greater than 1 inch in substrate plane and to make a

smooth transition from one plane to the other. Transition membrane shall be installed continuously from air barrier material onto sheet metal maintaining 2 inch overlap on both edges.

10. Lap transition material over top edge of through-wall flashing and head-flashing.
11. Provide backup for the membrane to accommodate anticipated movement or use other Manufacturer approved transition material at deflection and control joints.
12. Provide transition material to joint assemblies at expansion and seismic joints.
13. Provide backup for the fluid applied air barrier to accommodate anticipated movement at deflection and control joints as recommended by material Manufacturer.
14. Apply a bead or trowel coat of mastic along membrane seams at reverse lapped seams, rough cuts, and / or as otherwise recommended by the material Manufacturer.
15. Seal top edge of the self-adhered membrane to substrate with termination mastic at end of each working day.
16. Inspect installation prior to enclosing assembly and repair punctures, damaged areas and inadequately lapped seams with a patch of membrane lapped as recommended by material Manufacturer.
17. Install primer for fluid-applied air barrier if instructed by material Manufacturer.
18. Install fluid-applied membrane using equipment and methods recommended by Manufacturer to achieve a dry film thickness as required by the material Manufacturer.
19. Do not allow materials to come in contact with chemically incompatible materials.
20. Do not expose membrane to sunlight longer than as recommended by the Manufacturer.
21. Turn flashing membrane into window opening at sill, jambs and heads. Terminate just before interior sealant bead.

3.4 FIELD QUALITY CONTROL

A. Owner’s Inspection and Testing: Cooperate with Owner’s testing agency as applicable. Allow access to work areas and staging. Notify Owner’s testing agency in writing of schedule for Work of this Section to allow sufficient time for testing and inspection. Do not cover Work of this Section until testing and inspection is accepted.

B. Manufacturer’s Field Representative Review: Contractor is not to commence any work other than staging until contact and meeting with the Manufacturer’s Field Representative on site. The Manufacturer’s Field Representative is to visit the jobsite a minimum of four (4) times to review work processes and / or work completed prior to work commencement, at 10% completion, at 50% completion and prior to the work being covered by finish materials.

3.5 PROTECTING AND CLEANING

A. Protect air barrier materials from damage during installation and the remainder of the construction period, according to material Manufacturer's written instructions.

1. Coordinate with installation of materials which cover the air barrier assemblies, to ensure exposure period does not exceed that recommended by the air barrier Manufacturer.

B. Clean spillage/soiling at adjacent construction using cleaning agents/procedures recommended by Manufacturer of affected construction and acceptable to the primary material Manufacturer.

END OF SECTION 07 27 26

SECTION 07 42 13.23 - METAL COMPOSITE MATERIAL WALL PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Metal composite material wall panels.
   2. Accessories necessary for a complete installation.

B. Related Sections:
   1. Section 05 40 00 - Cold Formed Metal Framing: Exterior wall framing.
   2. Section 07 21 00 - Thermal Insulation: Continuous insulation.
   3. Section 07 92 00 - Joint Sealants.

1.3 REFERENCE STANDARDS

A. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems; 2015.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

C. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2023.

D. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2018.

E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

G. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.

H. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.

I. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).

J. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2023).

K. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).

L. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2014, with Errata (2020).

M. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2023.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, licensed in the State of Texas with experience in the design of metal composite wall panels as part of curtainwalls and aluminum storefront systems to design and coordinate the cladding assembly using performance requirements and design criteria indicated.

B. Structural Performance: Provide metal composite material panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E330/E330M:
   1. Wind Loads: As indicated on Drawings.

2. Other Design Loads: As indicated on Drawings
3. Deflection Limits: For wind loads, no greater than 1/240 of the span.

C. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E283/E283M at the following test-pressure difference:
1. Test Pressure Difference: 1.57 lbf/sq. ft. and 6.24 lbf/sq. ft.

D. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E331 at the following test-pressure difference:
1. Test Pressure Difference: 2.86 lbf/sq. ft. and 6.24 lbf/sq. ft.

E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 degrees F, ambient; 180 degrees F material surfaces.

F. Fire Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Indicate design designations from ULI Fire Resistance Directory or from the listings of another qualified testing agency.

G. Fire Propagation Characteristics: Metal composite material wall panel system passes NFPA 285 testing.

1.5 SUBMITTALS

A. Product Data: Technical data including construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings: Submit fabrication and installation layouts of metal composite material panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment assembly, trim, flashings, closures, and accessories; and special details.
1. Accessories: Include details of the flashing, trim and anchorage, at a scale of not less than 1-1/2 inches per 12 inches.

C. Samples: Submit MCM panel samples, 12 inches long by actual panel width with fasteners, closures, and other metal composite material panel accessories.

D. Qualification Data: Submit Installer’s qualifications.

E. Product Test Reports: Submit copy of required tests performed by a qualified testing agency within the past 36 months.

F. Exterior Product Approvals:
1. Manufacturer shall certify that product complies with and has been tested and approved in compliance with Florida Product Approval or Miami Dade NOA and applicable requirements.
2. Manufacturer shall certify that product complies with large [and small] missile impact criteria and has been tested and approved in compliance with Florida Product Approval or Miami Dade NOA and applicable requirements.

G. Field quality control reports.

H. Maintenance Data: Submit maintenance data for metal composite material panels for inclusion in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements:
1. Building Code: Comply with applicable requirements of IBC for building cladding.
2. Energy Code: Comply with applicable provisions of the IECC.
3. Surface Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
a. Flame Spread Index: 25 or less.

b. Smoke Developed Index: 450 or less.

4. Fire Propagation Characteristics: Metal composite material wall panel system passing NFPA 285 testing.
5. Welding Standards: Welding shall be performed by skilled and qualified mechanics. Welding shall be performed in accordance with the applicable provisions of AWS D1.1/D1.1M Structural Welding Code - Steel and AWS D1.2/D1.2M Structural Welding Code - Aluminum.

B. Installer Qualifications: Entity having minimum 5 years documented experience that employs installers and supervisors who are trained and approved by manufacturer.

C. Mockups: Build mockups to verify selections and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
1. Build mockup of typical metal composite material panel assembly shown on Drawings, including corner, soffits, supports, attachments, and accessories.
2. Water Spray Test: Conduct water spray test of mockup of metal composite material panel assembly, testing for water penetration according to AAMA 501.2.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

D. Pre-Installation Conference: Conduct conference at site.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal composite material panels, and manufactured items to prevent damage or deformation. Package metal composite material panels for protection during transportation and handling.

B. Unload, store, and erect metal composite material panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal composite material panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal composite material panels to ensure dryness, with positive slope for drainage of water. Do not store metal composite material panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal composite material panels during installation.

E. Copper Panels: Wear gloves when handling to prevent fingerprints and soiling of surface.

1.8 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation when existing and forecasted weather conditions permit assembly of metal composite material panels to be performed according to manufacturers' written instructions and warranty requirements.

1.9 COORDINATION

A. Coordinate metal composite material panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

A. Written warranty signed by manufacturer in which manufacturer agrees to repair or replace components of metal composite material panel systems that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
a. Structural failures including rupturing, cracking, or puncturing.
b. Deterioration of metals and other materials beyond normal weathering.
2. Warranty Period: Two years from date of Substantial Completion.

B. Panel Finishes: Written warranty signed by manufacturer in which manufacturer agrees to repair finish or replace metal composite material panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
   2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
   1. Alcoa Architectural Products (USA).
   2. Alcotex Inc.
   3. ALPOLIC Materials; Mitsubishi Plastics Composites America.
   4. ALUCOBOND; 3A Composites USA, Inc.
   5. Alucoil North America.
   6. CENTRIA Architectural Systems.
   7. Citadel Architectural Products, Inc.
   8. NOW Specialties, Inc.: www.nowspecialties.com.

B. Substitutions: Refer to Section - 01 25 00 - Substitution Procedures.
   1. Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution

2.2 METAL COMPOSITE MATERIAL WALL PANELS

A. Metal Composite Material Wall Panel Systems: Provide factory-formed and -assembled, metal composite material wall panels fabricated from two metal facings that are bonded to a solid, extruded thermoplastic core; formed into profile for installation method indicated. Include attachment assembly components, panel stiffeners, and accessories required for weathertight system.

B. Aluminum-Faced Composite Wall Panels (ACM-1):
   1. Facings: 0.020 inch thick, aluminum sheet
   2. Panel Thickness: 0.157 inch .
   3. Core: Fire retardant.
   4. Exterior Finish: Clear anodized.

C. Attachment Assembly: Rainscreen principle system.

D. Attachment Assembly Components: Formed from material compatible with panel facing.

E. Miscellaneous Materials:
   1. Miscellaneous Metal Subframing and Furring: ASTM C645, cold formed, metallic coated steel sheet ASTM A653/A653M, G90 (Z275 hot dip galvanized) coating designation or ASTM A792/A792M, Class AZ50 (Class AZM150) aluminum zinc alloy coating designation unless otherwise indicated. Provide sections necessary for support and alignment of metal composite material panel system.
   2. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal composite material panels unless otherwise indicated.
   3. Flashing and Trim: Provide flashing and trim formed from same material as metal composite material panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal composite material panels.

4. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal composite material panels by means of plastic caps or factory applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
5. Panel Sealants: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal composite material panels and remain weathertight; and as recommended in writing by metal composite material panel manufacturer.
6. Waterproofing Membrane: 60 mil-thick SBS modified bituminous product of self-adhering type with non-stick surface conforming to “TAMKO TW - Metal and Tile Underlayment” as manufactured by Tamko Roofing Products, Inc. or Architect approved equal.

2.3 FABRICATION

A. Fabricate and finish metal composite material panels and accessories at the factory, using procedures and processes necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Fabricate metal composite material panel joints with factory installed captive gaskets or separator strips that provide a weathertight seal and prevent metal to metal contact, and that minimize noise from movements.

C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA Architectural Sheet Metal Manual that apply to design, dimensions, metal, and other characteristics of item indicated.
1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Aluminum: Fabricate nonmoving seams with flat lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
    a. Size: Recommended by SMACNA Architectural Sheet Metal Manual or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.4 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one/half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Aluminum Panels and Accessories:
1. Exposed Anodized Finish:
    a. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, AA-M12C22A31, Class II.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal composite material panel supports, and other conditions affecting performance of the Work.
   1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal composite material wall panel manufacturer.
   2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal composite material wall panel manufacturer.
      a. Verify that air or water resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing in for components and assemblies penetrating metal composite material panels to verify actual locations of penetrations relative to seam locations of metal composite material panels before installation.

C. Proceed with installation after correcting unsatisfactory conditions.

3.2 PREPARATION

A. Miscellaneous Supports: Install sub-framing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal composite material panel manufacturer's written recommendations.

3.3 METAL COMPOSITE MATERIAL PANEL INSTALLATION

A. Install metal composite material panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to supports unless otherwise indicated. Anchor metal composite material panels and other components of the work securely in place, with provisions for thermal and structural movement.
   1. Shim or otherwise plumb substrates receiving metal composite material panels.
   2. Flash and seal metal composite material panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air or water resistive barriers and flashings that will be concealed by metal composite material panels are installed.
   3. Install screw fasteners in predrilled holes.
   4. Locate and space fastenings in uniform vertical and horizontal alignment.
   5. Install flashing and trim as metal composite material panel work proceeds.
   6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
   7. Align bottoms of metal composite material panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
   8. Provide weathertight escutcheons for pipe and conduit penetrating panels.

B. Fasteners:
   1. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized steel fasteners for surfaces exposed to the interior.
   2. Copper Panels: Use copper, stainless steel or hardware-bronze fasteners.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal composite material panel manufacturer.

D. Attachment Assembly, General: Install attachment assembly required to support metal composite material wall panels and to provide a complete weathertight wall system, including subgirts, perimeter extrusions, tracks, drainage channels, panel clips, and anchor channels.
   1. Include attachment to supports, panel to panel joinery, panel to dissimilar material joinery, and panel system joint seals.

E. Installation: Attach metal composite material wall panels to supports at locations, spacings, and with fasteners recommended by manufacturer to achieve performance requirements specified.
   1. Rainscreen Systems: Do not apply sealants to joints unless otherwise indicated.

F. Rainscreen Principle Installation: Install using assembly with vertical channel that provides support and secondary drainage assembly, draining at base of wall. Notch vertical channel to receive support pins. Install vertical channels supported by channel brackets or adjuster angles and at locations, spacings, and with fasteners recommended by manufacturer. Attach metal composite material wall panels by inserting horizontal support pins into notches in vertical channels and into flanges of panels. Leave horizontal and vertical joints with open reveal.
   1. Install wall panels to allow individual panels to be installed and removed without disturbing adjacent panels.
   2. Do not apply sealants to joints unless otherwise indicated.

G. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
   1. Install components required for a complete metal composite material panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal composite material panel manufacturer; provide types recommended in writing by metal composite material panel manufacturer.

H. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA Architectural Sheet Metal Manual. Provide concealed fasteners where possible and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
   1. Install exposed flashing and trim that is without buckling and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof performance.
   2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches (605 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.4 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal composite material wall panel units within installed tolerance of 1/4 inch in 20 feet, nonaccumulative, on level, plumb, and location lines as indicated, and within 1/8 inch offset of adjoining faces and of alignment of matching profiles.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing agency to perform field tests and inspections.

B. Water Spray Test: After installation, test area of assembly directed by Architect for water penetration according to AAMA 501.2.

C. Manufacturer Field Service: Engage a factory authorized service representative to test and inspect completed metal composite material wall panel installation, including accessories.

D. Metal composite material wall panels are considered defective if they do not pass test and inspections.

E. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.

F. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films as metal composite material panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal composite material panel installation, clean finished surfaces as recommended by metal composite material panel manufacturer. Maintain in a clean condition during construction.

B. After metal composite material panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal composite material panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 42 13.23

SECTION 07 42 16 - METAL WALL AND SOFFIT PANELS

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable to this Section.

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Section 07 62 00 – Roof Related Sheet Metal

B. Section 07 92 00 - Joint Sealants

1.2 DELIVERY AND STORAGE

A. All panels shall be delivered with appropriate packaging to provide protection against transportation damage. Materials damaged in shipping or storage shall not be used.

B. Store all materials and accessories above ground on well-skidded platforms. Store under waterproof covering. Provide proper ventilation to panels to prevent condensation build-up between panels.

1.3 COORDINATION

A. Coordinate work with installation of associated metal flashings and manufactured roof panels.

1.4 WARRANTY

A. Provide a five (5) year contractor's workmanship and water-tightness warranty.

B. Provide a manufacturer's twenty (20) year finish warranty.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Wall Siding Panels: 24 ga. Galvalume metal

B. Style: One (1) inch thick Striated Flush panel with minimum width of 11" and maximum width of 12 inches.

C. Finish: Factory-prefinished with an exterior surface of Kynar 500® or Hylar 500® based coating having a resin content consisting of at least 70 percent PVDF fluoropolymer resin content, in at least 1.0 mil thickness, in color(s) as selected by Owner; interior surface finish, manufacturer's standard.

D. Soffit Panels: Vented thickness as recommended by Manufacturer of wall panels, aluminum. Manufacturer shall be the same as wall panel manufacturer.

E. Accessories:
1. Polyisocyanurate Insulation: Shall comply with NFPA 285 and ASTM E2357 and E331.Thickness shall be 2".
2. Zee Girts: 16-gauge minimum thickness galvanized steel, 2-inch rise minimum, or as required to align with existing conditions.
3. Sub-Girt Fasteners: Stainless Steel screws to meet application.

4. Concealed Fasteners: Stainless Steel screws supplied or recommended by panel manufacturer to suit application.
5. Metal Trim at Siding Panels: 22 ga. prefinished Galvalume sheet, finish type and color of siding panels.
6. Closures: 22 ga. prefinished Galvalume sheet matching finish type and color of siding panels.
7. Separate dissimilar metals with asphalt-saturated building felt or a bituminous coating to prevent galvanic action.
8. Air Barrier: Utilize high temperature product compatible with air barrier chosen from the fluid applied air barrier system specification.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine metal frame to ensure it is prepared to receive siding.

B. Ensure substrates are flat, free from objectionable warp, wave and buckle

3.2 INSTALLATION OF SIDING PANELS

A. Install zee-girts at maximum 24 inches on center (vertical max.) to satisfy local building code, at least three per panel length. Fasten girts to the wall with two fasteners at 18 inches on center max.

B. Comply with manufacturer's instructions for assembly, installation and erection to achieve weathertight installation.

C. Install waterproof membrane behind zee

D. Girts for unvented panels only. Seal all laps.

E. Fasten siding panels along each zee-girt.

F. Install closures and trim to form a complete installation.

G. Install sheet metal flashings according to provisions of Section 07 62 00.

3.3 PROTECTION

A. Protect roofing and siding from damage and discoloration.

B. Repair damaged or discolored panels.

END OF SECTION 07 42 16

SECTION 07 52 19 - MODIFIED BITUMEN "COOL ROOF" MEMBRANE ROOFING SYSTEM

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. Providing coordination for the entire roofing assembly, including, but not limited to:
   1. Tapered edge strips, cant strips, and wood nailers. (Refer to this Section and Section 06 10 00)
   2. Modified bitumen membrane roofing
   3. Flashings, including sheet metal perimeter edge (fascia) (Refer this Section and Section 07 62 00).
   4. Work incidental to, the complete and proper installation of a watertight modified bitumen membrane roofing system as shown on the drawings or specified herein, and in accordance with all applicable requirements of the Contract Documents.

B. It is the intent of this Section that the Work shall:
   1. provide a watertight facility;
   2. conform to all applicable building code requirements and of authorities having jurisdiction;
   3. include Section 07 62 00, Roof Related Sheet Metal as part of the Work of this Section; and be performed to obtain a single responsibility total system warranty.

C. Work and materials hereinafter specified shall be best of kind described and, unless specified otherwise, shall be new and of best quality. All roofing materials utilized in performance of each type of work shall be the products of one (1) manufacturer or supplier.

1.3 RELATED WORK

A. All Sections of Work relating to the roofing system, including mechanical, plumbing and electrical items penetrating the roof system.

1.4 REFERENCES

A. American Society for Testing and Materials (ASTM)
   1. C920, Standard Specification for Elastomeric Joint Sealants
   2. D41, Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
   3. D312, Standard Specification for Asphalt Used in Roofing
   4. D2178, Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing
   5. D4479, Standard Specification for Asphalt Roof Coatings - Asbestos-Free
   6. D4586, Standard Specification for Asphalt Roof Cement, Asbestos-Free
   7. D4601, Standard Specification for Asphalt-Coated Glass Fiber Sheet Used in Roofing
   8. D5147, Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material
   9. D6163, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements

B. ASCE-7 Wind uplifts requirements for geographical area.

C. Federal Specifications (FS)
   1. SS-R-620B
   2. TT-S-00230C

D. National Roofing Contractors Association (NRCA)
   1. Roofing and Waterproofing Manual

E. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)
   1. Architectural Sheet Metal Manual

F. International Building Code

G. Underwriters' Laboratories (UL)
   1. Fire Hazards Classifications

1.5 SUBMITTALS

A. Product Data: Submit manufacturer's printed instructions, schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, product variations, fastener pattern layout, and accessories to be used in the Work.

B. Certifications:
   1. Manufacturer's written certification that installer is approved and licensed to install specified roofing system. (Submit a copy with Proposal Form).
   2. Manufacturer's affidavit that materials used in Project contain no asbestos.
   3. Installer shall submit resume and project experience list for proposed system for Project Manager and job site superintendent.
   4. Installer shall submit written certification that there are no undocumented workers being employed by them or by any subcontractor on this project and that all workers on this project are covered by workmen's compensation.
   5. Installer shall submit list of all subcontractors with evidence of subcontractor's insurance coverage in compliance with contract requirements.
   6. Manufacturer's written certification of approval / acceptance of these specifications and details.
   7. Warranty: Submit letter from manufacturer signed by agent authorized to do so, stating acceptance of warranty as specified and detailed.

C. Referenced Standards: Two (2) copies of each referenced standard and retain approved copies at site.

D. Shop Drawings: Furnish from copies of the manufacturer's literature or from copies of NRCA "Roofing and Waterproofing Manual", fourth edition.
   1. Furnish for approval any proposed details which differ from those included with this proposal package. All proposed details shall first be approved in writing by roofing manufacturers prior to submitting to Architect for approval.
   2. Furnish detail project sequencing, staging, material loading, manpower plans, and project construction schedule for approval.

E. Samples:
   1. Submit sample copy of job specific warranty that is to be issued upon project completion.

2. Submit mock-up of all fabricated sheet metal items.
3. Submit 12 inch x 12 inch sample of all types of roof membranes to be installed.

F. Temperature Charts: Bitumen heating devices 24 hour temperature charts.

G. Test Reports: Bitumen manufacturer's test reports relative to the following for each batch of bitumen furnished:
1. Softening Point: ASTM D312.
2. Flashpoint: ASTM D92.
3. Acceptable Bitumen Temperature: As recommended by the bitumen manufacturer and EVT label on containers.
4. Thermometers: Two (2) hand held, "8F" thermometers complying with ASTM E1 to Architect for his checking kettle temperature.

H. Upon Substantial Completion of Work, submit the following to Architect for his submission to Owner:
1. Manufacturer's Warranty: Manufacturer's written warranty as specified.
2. Maintenance Procedures: Three (3) copies of manufacturer's printed instructions for Owner's use regarding care and maintenance of roof.

1.6 PROJECT CONDITIONS

A. Weather Condition Limitations: Proceed with roofing work when existing and forecasted weather conditions permit work to be performed in accordance with manufacturer's recommendations and warranty requirements. Roofing application with moisture present will not be accepted. Do not attempt construction of the roofing system when the reported or calculated dew point are within three (3) degrees of each other

B. Do not allow waste products, petroleum, grease, oil solvents, mineral oil, and other contaminants to come into contact with the roofing system before or during installation. Advise Owner if there is a possibility of his facility emitting such contaminants in the future.

1.7 INSPECTIONS / TESTS

A. The Architect's and Manufacturer's representative shall at all times have access to the job site and work areas. The contractor will provide proper and safe facilities for such access and inspection.
1. Architect Inspections: The Architect will be providing periodic inspections throughout the duration of the project. Architect's Representative shall be required to inspect after completion of each major phase of construction for approval.
2. Manufacturer Inspections:
   a. An inspection shall be made by a representative of the material manufacturer at appropriate intervals during performance of Work to ensure that said project is installed in accordance with the manufacturer's specifications and illustrated details. Written reports by the manufacturer shall be turned over to the Architect, on each Monday following the prior week.
   b. The authorized material manufacturer's field representative shall be responsible for:
      1) Keeping the Architect's representative informed after periodic inspections as to the progress and quality of the work observed.
      2) Calling to the attention of the contractor those matters observed which are considered to be in violation of the contract requirements.

3) Reporting to the Architect's representative, in writing, any failure or refusal of the contractor to correct unacceptable practices called to his attention.
4) Confirming, after completion of the work and based on his observation and test, that he has observed no application procedures in conflict with these specifications.

B. Any failure by the Architect's or Manufacturer's Representative to detect, pinpoint, or object to any defect or noncompliance of these specifications of work in progress or completed work shall not relieve the contractor, or reduce, or in any way limit, his responsibility of full performance of work required of him under these specifications.

C. Architect may require tests and inspections as necessary to verify quality of roofing materials and workmanship. Laboratory tests will be performed in accordance with ASTM standard procedures.
1. Owner will select testing laboratory and will pay for Work required by testing laboratory.
2. Re-tests for work which fail initial tests or inspections shall be paid by contractor.
3. Noncompliance with contractor requirements will result in the Architect/Owner to assign full time quality control and will be subject to reimbursement by the construction manager/contractor.

1.8 QUALITY ASSURANCE

A. Applicator:
1. A base ply inspection shall be conducted before ANY cap ply is installed. Base ply inspection attendees shall include manufacturer, DISD roofing supervisor, 3rd Party Consultant, roofing contractor, general contractor / construction manager, Architect, and Program Manager.
2. Applicator shall have approval by manufacturer of accepted roofing system for application and issuance of specified warranty for a minimum of three (3) years. Proof of license agreement dated at least three years prior to date of bid opening.
3. Applicator shall be an experienced single firm specializing in the type of roofing and sheet metal work specified, with a minimum of five (5) years of previous successful experience on projects similar in size and scope.
4. No subcontracting of sheet metal fabrication or installation will be accepted. Contractor must have a sheet metal shop on the company premises.
5. Applicators shall have a competent Superintendent, who is not actually performing roofing work, on site at all time while work is in progress, with full authority to act on behalf of the Contractor as his agent.
6. All workmen shall be covered by Workmen's Compensation insurance (verify upon request) and thoroughly experienced in the particular class of work upon which employed. Use of undocumented workers will not be tolerated - No Exceptions.
7. Contractor shall ensure that base fastener pull out resistance tests on existing decks were performed and approved by Architect and coordinated with Roofing Consultant prior to starting roofing application.
8. Roofing contractor must have reached the highest level of qualifications from the manufacture they are providing material for (i.e. Master Select contractor).
9. A final inspection shall be conducted when roofing scope is completed. Final inspection attendees shall include manufacturer, DISD Roofing Supervisor, 3rd Party Consultant, roofing contractor, general contractor / construction manager, Architect, and Program Manager.

B. Regulatory Requirements:
1. Classification by Underwriters' Laboratories, Inc. as a Class A roof covering.

2. Roofing system shall be installed in accordance with ASCE-7 wind uplift requirements for geographical location exposure B, 110 MPH 3-second gust wind speed zone and an importance factor of 1.15 based on IBC building code requirements. Wind-resistance loads listed below have a safety factor of 2.0 incorporated into the calculation.
    a. Zone 1 Field -73.6 psf or as otherwise indicated by Structural
    b. Zone 2 Perimeter -123.4 psf or as otherwise indicated by Structural
    c. Zone 3 Corner -185.8 psf or as otherwise indicated by Structural
3. Follow local, state, and federal regulations of safety standards and codes. Refer to applicable building code or International Building Code for roofing system installation requirements and limitations.

C. Laboratory Testing and Samples:
1. Architect may require tests and inspections as necessary to verify quality of roofing materials and workmanship. Laboratory tests will be performed in accordance with ASTM procedures.
2. Owner will select testing laboratory and will pay for Work required by testing laboratory. Contractor shall assume all costs for extraction and patch of all samples.
3. Re-tests for work which fail initial tests or contractor shall pay inspections.
4. Contractor shall correct all deficiencies in accordance with manufacturers recommended procedures at no cost to Owner.

D. Installation:
1. Unless otherwise indicated, the materials to be used in this specification are those specified and denote the type, quality, performance, etc. required. All proposals shall be based upon the use of the specified material.
2. Install materials in accordance with the manufacturer's current published application procedures and the general recommendations of the National Roofing Contractors Association.
3. It will be the contractor's responsibility to obtain and/or verify any necessary dimensions by visiting the job site, and the contractor shall be responsible for the correctness of it. Any drawings supplied are for reference only.
4. Contractor shall plan and conduct the operations of the work so that each section started on one day is complete, details installed and thoroughly protected and in watertight condition before the close of work for that day.
5. Materials will be securely fastened in place in a watertight, neat and workmanlike manner. All workmen shall be thoroughly experienced in the particular class of work upon which employed. Work shall be performed in accordance with these specifications and shall meet the approval in the field of the Architect.
6. All waste materials, rubbish, etc., shall be removed from the Owner's premises as accumulated. Rubbish shall be carefully handled to reduce the spread of dust, and shall be deposited at an approved disposal site. At completion, all work areas shall be left broom clean and all contractors' equipment and materials removed from the site.

1.9 PERFORMANCE REQUIREMENTS

A. Fire Resistance: Meet Underwriter's Laboratory Class "A" fire rating.

B. Contractor shall ensure that base fastener pull out resistance tests on structural roof deck are performed and approved by Architect and coordinated with Roofing Consultant prior to starting roofing application.

1.10 PRE-INSTALLATION CONFERENCE

A. Refer to Section 01 31 00 – Project Management and Coordination.

B. A Roofing preconstruction conference shall be held before ANY roofing material is installed. Roofing preconstruction conference shall include manufacturer, DISD Roofing Supervisor, 3rd Party Consultant, roofing contractor, general contractor / construction manager, Architect, Program Manager, Mason, and Waterproofer,

1.11 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original unopened packaging with all tags and labels intact and legible. Carton and can labels shall indicate appropriate warnings, storage conditions, lot numbers, and usage instructions. Handle and store materials and equipment in such a manner as to avoid damage. Coordinate material storage with school Principal.

B. Manufacturer's packaging and/or roll plastic is not acceptable for exterior storage. Tarpaulin with grommets shall be minimum acceptable for exterior coverings. All materials stored as above shall be minimum of four (4) inches off the substrate, and the tarpaulin tied off with rope.

C. Products liable to degrade as a result of being frozen shall be maintained above 40 degrees F in heated storage.

D. Moisture sensitive products shall be maintained in dry storage areas or properly covered. Roofing insulation and membranes must always be covered or stored in a dry area when not being used.

E. The proper storage of materials is the sole responsibility of the contractor. Materials damaged in shipping or storage shall not be used. Wet or damaged roofing materials shall be discarded, removed from job site, and replaced with new materials prior to application.

F. No storage of materials shall be permitted on roof areas other than those materials that are to be installed the same day. Any exception must be in written form. Do not place materials or equipment in such a manner as to overload structure.

1.12 PRECAUTIONS

A. Some of the indicated materials are extremely flammable and/or toxic. Use precautions indicated on can and carton labels.

B. Due caution should be exercised so as not to alter the structural integrity of the deck. When cutting through any deck, care should be taken so as not to damage the deck or any part of the deck, such as post tension cables, etc.

C. If torches are used, Contractor shall maintain a three (3) hour fire watch after completion of torching of each day's work. Provide a 20 lb. fire extinguisher near torch at all times. Use a thermal infrared thermometer to monitor all roof areas.

D. The contractor is to verify the location of all interior ducts, electrical lines, piping, conduit, and/or similar obstructions. The contractor is to perform all work in such a manner as to avoid contact with the above mentioned items.

1.13 WARRANTY

A. Roofing Manufacturer: Warrant the roofing and associated Work for 20 years from date of Substantial Completion as follows:
   1. The warranty shall be a NDL “No Dollar Limit” / no penal sum type, with total replacement cost.
   2. The warranty shall guarantee the entire roof system and associated work against defective materials and workmanship of installation, with NO exclusion for ponding water.
   3. The roof system shall include roof insulation, flashing, metal work, labor, and material shall be guaranteed against failure of workmanship and materials. Repair of the system, including materials and labor, shall be done at no cost to the Owner.

B. Roofing Contractor: Jointly with any subcontractors employed by him, shall guarantee the work required and performed under this contract will be free from defects in workmanship and materials, and that the building will be and remain waterproof for a five (5) year warranty period, after the Architect accepts the work as substantially complete. The warranty shall be in approved notarized written form, to obligate the Contractor, and subcontractors, to make good the requirements of the warranty. The warranty will be held jointly with the Bonding Company for the first two (2) years and the manufacturer for the remaining three (3) years.

C. Make arrangements with the materials manufacturer to provide required inspections for issuance of warranty. Final warranty shall be submitted to Owner at time of Substantial Completion. There shall be a minimum of 1 inspection per each 10,000 SF of roofing installed.

PART 2 - PRODUCTS

2.1 GENERAL

A. All materials shall be manufactured, specified, or accepted in writing by membrane manufacturer issuing the warranty. Proposed materials shall ensure full system warranty from said manufacturer.

B. Samples of all materials used on the project, which are not supplied by the membrane manufacturer, shall be submitted to the membrane manufacturer for written approval prior to starting work.

C. All materials used on the project shall be asbestos free.

2.2 APPROVED PRODUCTS / MANUFACTURERS

A. Unless noted otherwise, specifications are based on products of named manufacturers but should not preclude the Contractor from using other manufacturers who produce products that meet or exceed the specifications. Manufacturers whose products meet or exceed the specifications, who have manufactured and installed roof materials and systems of the type specified for a minimum of ten (10) years, and who maintains a single source responsibility for the total roofing system, as described herein, may apply for approval as a substitution in accordance with Division 1 requirements regarding substitutions.
   1. All materials shall be manufactured, specified, or accepted in writing by membrane manufacturer issuing the warranty. Proposed materials shall ensure full system

warranty from said manufacturer. Installer shall be an applicator licensed by the manufacturer.

2. Samples of all materials used on the project, which are not supplied by the membrane manufacturer, shall be submitted to the membrane manufacturer for written approval prior to starting work.
3. All materials used on the project shall be asbestos free.

B. Approved Manufactures:
1. Siplast, Inc., Irving, Texas; (972) 869-0070
2. Soprema, Wadsworth, OH; (800) 356-3521
3. GAF, Parsippany, NJ: (973) 628-3000
4. Johns Manville, Denver, CO; (800) 654-3103

2.3 ROOF MEMBRANE ASSEMBLY

A. System Description: A roof membrane assembly consisting of two (2) plies of a prefabricated, reinforced, homogeneous polymer modified asphalt membrane, secured to specified insulation or substrate. The assembly shall possess waterproofing capability, such that a phased roof application, with only the modified bitumen base ply in place, can be achieved for prolonged periods of time without detriment to the watertight integrity of the entire roof system. Contractor to only torch apply membranes. Cold adhesives and hot mop are not allowed – confirm special membrane types with manufacturer. Provide components of the roof membrane assembly meeting the following physical and mechanical requirements.

1. **Torch Applied Modified Bitumen Base Ply:** Approximately 120 mil high performance modified bitumen base ply consisting of a lightweight random fibrous glass mat impregnated and coated with high quality modified bitumen and having the following properties:
   a. Approved Product:
      1) Siplast Product: Paradiene 20 TG
      2) Soprema Product: Elastophene Flam
      3) GAF Product: Ruberoid HW 25 Smooth Membrane
      4) JM Product: DynaWeld Base
2. **Torch Applied Modified Bitumen Finish Ply:** Approximately 140 mil (or more) high performance modified bitumen “cool roof” reflective white finish ply consisting of a lightweight random fibrous glass mat impregnated and coated with high quality Styrene-Butadiene-Styrene (SBS) modified bitumen, and having the following properties:
   a. Approvals: UL Approved, FM Approved (products shall bear seals of approval).
   b. Surfacing: White synthetic chips
   c. Solar Reflectance (avg.): greater than 3 year aged .75
   d. Thermal Emittance (avg.): greater than 3 year aged .75
   e. Solar Reflectance Index (avg.): greater than 3 year aged 64
   f. Approved Product:
      1) Siplast Product: Paradiene 30 FR TG BW
      2) Soprema Product: Elastophene Flam LS FR GR SG
      3) GAF Product: Ruberoid EnergyCap HW Plus Granule FR Membrane
      4) JM Product: Dynaweld Cap FR CR
3. Stripping Ply: Same as roof system base ply.

2.4 FLASHING MEMBRANE ASSEMBLY

A. A flashing membrane assembly consisting of two (2) plies of reinforced, polymer modified asphalt membrane. FOIL FACED FLASHING PRODUCTS ARE NOT PERMITTED. Finish to be same highly reflective granule surfacing.
   1. Modified Bitumen Flashing Sheet Surface: Same as roof system finish ply.
   2. Modified Bitumen Flashing Sheet:
      a. Siplast Product: Polyester reinforced product matching granule cap ply finish
      b. Soprema Product: Polyester reinforced product matching granule cap ply finish
      c. GAF Product: Polyester reinforced product matching granule cap ply finish
      d. JM Product: Polyester reinforced product matching granule cap ply finish

2.5 ROUGH CARPENTRY

A. All nailers, cants and wooden curbs shall be No. 2 or better treated lumber selected to meet design details and field dimensions and requirements of Section 06 10 00, Rough Carpentry. MCQ and MCA only.

2.6 ROOFING SHEET METAL

A. Refer to Section 07 62 00, Roof Related Sheet Metal.

2.7 ROOF INSULATION

A. Roofing Insulation:
   1. All insulation shall be approved in writing by the membrane manufacturer as to thickness, type, and manufacturer. All insulation must be approved for the specific application with UL and FM Global approval.
   2. Polyisocyanurate Roof Insulation: Shall comply with ASTM C1289 Type II Class 2, Grade 2 with inorganic coated glass facer on both sides, with a 20 psi minimum compressive strength. Thickness shall be a minimum total of 4.5” (or size specified on drawings) and divided in two staggered layers. Basis of specification shall be ENRGY 3 CGF as manufactured by Johns Manville.
      a. Acceptable substitute manufacturers include Atlas Roofing and Hunter Panels.
   3. Cover Board: Glass-Faced Gypsum Roof Board equal to UL rated Type X “DensDeck Prime Roof Board w/ Eonic Technology” as manufactured by Georgia-Pacific. Stock board sizes shall be 48" x 48" x ½” or as indicated on drawings for roof assembly. Provide as required by manufacturer recommendation for project roof system(s). Approved substitute: Dexcell FA Glass Mat as manufactured by National Gypsum, (Cellulose boards not allowed)
   4. Substrate Board: Where required for fire rating or as indicated, 5/8 inch thick Gypsum Board, tapered-edged, conforming to ASTM C36, Type X. Sizes shall be 4 feet-0 inches wide by longest practical length to minimize joints.
   5. Polyisocyanurate Tapered Roof Insulation: Shall comply with ASTM C1289 Type II Class 2, Grade 2 with inorganic coated glass facer on both sides, with a 20 psi minimum compressive strength. Provide factory cut 48” x 48” stock board. Slope and thickness to vary as required to achieve a minimum ¼” per foot finished slope unless noted otherwise on the Drawings (cricketed areas between roof drains / scuppers are to achieve a minimum ½” per foot slope). Provide ½” cover board similar to that specified above tapered polyisocyanurate board insulation. Basis of specification shall be ENRGY 3 CGF as manufactured by Johns Manville.
      a. Acceptable substitute manufacturers include Atlas Roofing and Hunter Panels.

6. Tapered “Fesco” Edge Strip: 0” to 1½” tapered (or as required for field conditions), 18” wide x 48” long. Install at all expansion joints, curbs, projections, crickets, saddles and base flashings. Basis of specification shall be as manufactured by Johns Manville or approved substitute.

2.8 ROOFING ACCESSORIES

A. Bituminous Cutback Materials:
   1. Primer: A high flash, quick drying, asphalt solvent blend which meets or exceeds ASTM D41 requirements.
   2. Plastic Cement: An asphalt cutback mastic, reinforced with non-asbestos fibers, used as a base for setting metal flanges and conforming to ASTM D4586 Type II requirements.
   3. Flashing Cement: A heavy-bodied all-weather trowel grade mastic, used as a base for laying-up cold process flashing membrane where fast setting adhesives are required.

B. Sealants: A single component, high performance, elastomeric sealant conforming to ASTM D232 or ASTM C920 requirements. Acceptable types are as follows:
   1. Sonolastic NP 1 manufactured by Sonneborn Building Products; Minneapolis, MN (612) 835-3434

D. Ceramic Granules: No. 11 Grade Specification Ceramic granules of color scheme matching the granule surfacing of the finish ply.

E. Walkpads / Protection Pads: Provide cut sections of granule surfaced polyester reinforced modified bitumen sheet, such as “Dyna Tred Plus”.
   1. Walk pads shall have contrasting granule color from surfacing.
   2. Provide walk pads shall be installed at point of roof access, at service points of all roof mounted equipment requiring periodic maintenance.
   3. Protection pads shall have rounded corners and extend minimum four (4) inches beyond edge of overlying element.
   4. Provide new protection pads under all pipe supports, at HVAC and mechanical access points, in front of all roof top doors and openings.

F. Fasteners:
   1. Shall be Factory Mutual approved and as recommended by the manufacturer for the specific application.
   2. Fastener for Brick: Shall be 1/4 inch x 2 inches, stainless steel nail, one piece unit, flat head, as manufactured by Rawl Zamac Nailin, or approved equal.
   3. Fastener for Wood and Insulation (over steel decks): Provide 3” plated for insulation. Shall be a minimum #14 Factory Mutual approved fastener, fluorocarbon coated, with CR-10 coating. A minimum 0.200 inch diameter shank and 0.250 inch diameter thread. To be used with Factory Mutual approved, round pressure plates or bar, and having a fluorocarbon CR-10 coating, when subjected to 30 Kesternich cycles (DIN 50018) shows less than ten percent (10%) red rust which surpasses Factory Mutual Approval Standard 4470 as manufactured by Olympic Manufacturing Group, Inc., or pre-approved equal. Stainless Steel 304 when used with ACQ treated lumber.
   4. Nails: Stainless Steel ring shank, size as required to suite application, minimum 11 gauge with 3/8 inch diameter head.
   5. Iron-Lok Toggle: Shall be a toggle bolt with minimum 0.215 inch diameter shank and minimum 20 threads per inch, with a 2-1/2 inch wing span, with wing activated

adhesive and pressure plate, as manufactured by Olympic Manufacturing Group, Inc.

G. Liquid Flashings: One-Part Liquid Flashing is a one-component polyurethane / bitumen resin that provides a liquid flashing solution for asphaltic roofing systems. Utilize fabric in three part system at all penetrations.

2.9 MISCELLANEOUS MATERIALS AND ACCESSORIES

A. Other materials shall be as shown, specified or required and be of the best grade for the proposed use as recommended by the manufacturer.
   1. Expansion Joint: As detailed on drawings and outlined in NRCA and SMACNA manuals.
   2. Low Level expansion joints, as noted on the drawings, to be fabricated similar to Situra Inc. “Red Line” Low level expansion joint details. Install as per manufactures recommendations.
      a) Approved Substitute Soprema’s “Sopra Joint”. Install as per manufactures recommendations.
   3. Sealant Backer Rod: Provide compressible rod stack of polyethylene foam, polyurethane foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam or other flexible, permanent, durable, non-absorptive material as recommended by sealant manufacturer for back-up of and compatibility with sealant. Where used with hot-applied sealant, provide heat-resistant type which will not be deteriorated by sealant application temperature as indicated.
   4. Pipe Hangers and Supports: Provide and install all necessary supports for gas lines, conduit, chilled water lines, duct work, condensate lines, etc.. Refer to Section 07721, Roof Accessories.
   5. Cant Strips: Shall be wood fiber where used for non-structural purposes. Shall be treated solid wood where used for structural purposes meeting NRCA, Factory Mutual and Underwriters Laboratory guidelines. If solid wood cant is used where insulation exists, cant is to be toe nailed into treated solid wood nailer the same height as insulation.
   6. Termination Bar:
      a. Material: Extruded aluminum bar with lip profile.
      b. Size: 0.090 inch thick by 3/4 inch wide with 3/16 inch lip width and a 45 degree lip angle, factory punched 1/4 inch x 3/8 inch oval holes spaced six (6) inches on center.
      c. Approved Product/Manufacturer: “LIPTB 06” manufactured by Olympic Manufacturing Group, Inc., or approved equal.

PART 3 - EXECUTION

3.1 SITE CONDITIONS

A. Environmental Requirements:
   1. Apply roofing in dry weather.
   2. Do not apply roofing when ambient temperature is below 45 degrees F.
   3. Refer to manufacturers recommendations.
   4. A base ply inspection is required before **any** cap sheet is installed. Attendees must include DISD roofing supervisor, Manufacturer’s representative, DISD third party consultant, roofer, general contractor / construction manager, architect, and program manager. Any cap sheet installed prior to base ply inspection **will** need to be removed.

3.2 ROOFING AND FLASHING - GENERAL

A. Membrane Application: Install roofing in accordance with roofing system manufacturer's current published instructions and the following requirements. Application of roofing membrane components shall immediately follow installation of insulation as a continuous operation.

B. Aesthetic Considerations: An aesthetically pleasing overall appearance of the finished roof application is a standard requirement for this Project. Make necessary preparations, utilize recommended application techniques, apply the specified materials and exercise care in ensuring that the finished application is acceptable to the Owner.

C. Application of materials shall be in strict accordance with the manufacturer's recommendations except where more stringent requirements are shown or specified. In the instance of a conflict between these specifications and those of the manufacturer, the more stringent specifications shall take precedence.

D. General Installation:
1. Protect adjacent areas with tarpaulin or other durable materials.
2. Contractor shall prevent overspray, and be responsible for parking lot areas and/or adjoining areas not part of this contract.
3. Contractor shall be responsible for sealing, as required, all openings that may allow bitumen migration or drippage, i.e. pitch dams, envelopes, and filler strips.
4. Prepare surfaces according to manufacturer's or applicator's published instructions. All metal that is to receive bitumen, or come in contact with bitumen or adhesive, shall be first primed with appropriate primer. All Kynar 500 or Hylar 5000 finished metal shall be buff sanded on the surface which is to be primed prior to the application.
5. Use cleaning materials or primers necessary to render an acceptable surface/substrate.
6. All surfaces/substrates shall be clean and dry prior to application of materials. Roof deck substrates shall be inspected for moisture in accordance with the manufacturer’s recommendations. Architect’s representative shall witness inspection. Roofing installed before inspection by Architect’s representative shall be removed to allow inspection.
7. Prior to application membrane, all foreign matter, gravel, etc., shall be removed from the substrate. Debris between the substrate and plies is not acceptable.
8. Ambient temperature shall be 45 degrees F and rising.
9. Wrinkles, buckles, kinks, and fishmouths are not acceptable when adhering membrane.
10. Unadhered plies are not acceptable.
11. Primed cant strips shall be installed at the intersection of the deck and the vertical surfaces.
12. All flashings shall be mechanically top-fastened with a termination bar a minimum of six (6) inches on center at the top leading edge, and be a minimum of fourteen (14) inches in height above the finished membrane height.
13. On slopes greater than one (1) inch in 12 inches, refer to NRCA and/or manufacturer's guidelines for backnailing procedures and follow the more stringent guidelines for all specified materials. All materials installed on slopes greater than 1:12 shall be polyester reinforced.
14. Correct all errors in application the same work day they occur, including voids, fishmouths, dry laps or spots, wrinkles, ridges, blisters, bare spots, improper application, physical damage and all work not meeting specifications.

15. Cold adhesive processes are not permitted for membrane attachments.

3.3 NAILERS

A. Wood nailers shall be installed at perimeter edges or drip edges on outside perimeter of building in accordance with FM Global 1-49 securement requirements. All deck penetrations (soil stacks, mechanical curbs, etc.) shall receive wooden nailers stacked minimum 3/4 inch above designed deck thickness.

B. All Construction: Nailers shall be the same height as the finished height of the insulation layer. Nailers shall be anchored to resist a pull-out force of 175 pounds per foot. Fasteners shall be no less than two (2) per nailer, and be spaced at three (3) feet on center maximum or as required by FM Global 1-49 requirements. Provide nailers at all penetrations. Install / Raise all curbs, etc. a minimum of fourteen (14) inches above roof deck.

3.4 SUBSTRATE PREPARATION

A. Substrate Surface: Prepare substrate surfaces to insure proper and adequate installation, in strict accordance with the Contract Documents and approved Shop Drawings, or manufacturer's requirements.

B. Fill all gaps and voids between substrate components that are wider than 1/4 inch. Fill all gaps with same materials as the substrate.

C. The membrane manufacturer shall specify types of substrates that are suitable for use with the bonding adhesive.

D. Protection of Adjacent Areas or Surfaces: Protect adjacent areas or surfaces from damage as a result of the Work of this section. Remove sharp projections.

E. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

F. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of the roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.5 APPLICATION OF INSULATION AND COVER BOARD

A. General:

1. Manufacturer's Instructions: In regard to attachment, the manufacturer's instructions or specifications shall determine the suitability for an application.
2. Precautions: The surface of the insulation must not be ruptured or damaged prior to installation of the roof membrane. Replace damaged boards.
3. Thermal insulation boards shall be laid on the substrate in parallel rows with end joints staggered and butted as close as possible. All joints shall be tight and at the roof perimeter and roof penetrations, insulation shall be cut neatly and fitted to reduce openings to a minimum. All openings 1/4 inch or larger shall be filled with insulation.
4. Insulation shall be tapered or feathered at drains and scuppers to provide proper drainage (if applicable).
5. No more insulation shall be installed than can be covered by the base ply system by the end of the day or the onset of inclement weather.
6. Tapered insulation and crickets, when specified, shall be placed in accordance with the drawings and/or as required NRCA standards.

B. (Steel decks); Specified first layer of rigid insulation shall be mechanically fastened to the steel deck meeting ASCE-7 wind uplift requirements as dictated by wind zone applicable to location of project. Fasteners and fastening patterns shall be determined by building height, location and geographical area of the United States. It is the contractor's responsibility to consult current publications, literature, and bulletins of current codes and the manufacturer that are in effect at the time of this project.

C. For subsequent layer or layers of insulation or specified recovery board, the top surface of the underlying layer of insulation shall adhered with low-rise foam adhesive, and subsequent layers of insulation shall be applied using offset joints, so that all individual insulation layers joints are offset a minimum of six inches (6") both ways with the preceding layer, and immediately walked in place.

D. The cover board shall also be adhered with low-rise foam adhesive. Basis of specification shall be Densdeck Prime product or equivalent.

3.6 ROOF MEMBRANE INSTALLATION

A. Membrane Application: Install roofing in accordance with roofing system manufacturer's current published instructions and the following requirements. Application of roofing membrane components shall immediately follow application of insulation and cover board as a continuous operation.

B. Aesthetic Considerations: An aesthetically pleasing overall appearance of the finished roof application is a standard requirement for this Project. Make necessary preparations, utilize recommended application techniques, apply the specified materials (i.e. granules, metallic powder, etc.) and exercise care in ensuring that the finished application is acceptable to the Owner.

C. Adhesive Application: Cold adhesive attachment methods for modified bitumen membranes are not permitted.

D. Roofing Application: Apply all layers of roofing free of wrinkles, creases or fishmouths. Exert sufficient pressure on the roll during application to ensure prevention of air pockets. Lap seams between the base ply layer and the finish ply layer shall not coincide. Stagger the courses to ensure this.

1. Apply all layers of roofing so that water flows over or along lap seams, but never against laps.
2. Attach the base ply to the cover board via torch applied methods. Each sheet shall have minimum three (3) inch side laps and six (6) inch end laps. Each sheet shall be applied directly behind the adhesive applicator. Stagger end laps a minimum of three (3) feet.
3. Fully bond the finish ply to the base ply via torch applied methods. Each sheet shall have a minimum of three (3) inch side and six (6) end laps. Stagger end laps of the finish ply a minimum of three (3) feet. Stagger side laps of the finish ply a minimum of 12 inches from side laps in the underlying base ply. Stagger end laps of the finish ply a minimum of three (3) feet from end laps in the underlying base ply.
4. Maximum sheet lengths and special fastening of the specified roof membrane system may be required at various slope increments where the roof deck slope exceeds 1/2 inch per foot. The manufacturer shall provide acceptable sheet lengths and the required fastening schedule for all roofing sheet applications to applicable roof slopes.
5. Lap Treatment: A 20-pound roller shall be used on all side and end laps, following immediately behind application, apply uniform pressure across lap area to achieve a continuous visible bleed out.

E. Granule Embedment: Broadcast mineral granules over all bitumen overruns on the finish ply surface, while the bitumen is still hot, to ensure a monolithic color and adhesion.

3.7 ROOF FLASHING MEMBRANE INSTALLATION

A. Flashing - General:
1. Flashings shall be installed using the manufacturer's flashing membrane, with length of run not to exceed manufacturer's recommendations.
2. All flashing shall run vertically up the parapet or rise wall, not horizontally. Flashing sheets shall not exceed 39” wide, (36” wide exposed). Degranulate field cap ply for base flashing to be installed and adhered properly.
3. Flashings shall run vertically with a selvedge edge.
4. Wooden nailers or curbs shall be installed at all edges and openings in the roof, mechanically fastened to the deck. The nailers should be of exterior grade wolmanized timber, and of the same thickness as any insulation to be used on the roof.
5. Cant strips shall be installed at the intersection of the deck and/or all vertical surfaces. Prime all cants.
6. The roofing field membrane shall extend up over and to the top of cant strips at all vertical intersections or out to the roof's edge.
7. All substrates receiving flashing membrane shall be clean and primed with asphalt primer, prior to application.
8. All flashings shall be mechanically fastened with a continuous termination bar a maximum of six (6) inches on center, be a minimum of fourteen (14) inches above finished roof height (seal top with three (3) coursing), extend a minimum of nine (9) inches onto the field of horizontal roof membrane, and not exceed ten (10) linear feet of run in length.
9. Install flashing membrane in accordance with drawings and / or material manufacturer's guarantee requirements, whichever is the most stringent.
10. Exert sufficient pressure on the flashing membrane to ensure the prevention of air pockets. This can be accomplished by using a damp, kitchen type sponge mop or a damp, heavy duty cotton nap paint roller.
11. Prime all end laps of the flashing membrane with a uniform coating of the specified asphalt primer and allow to thoroughly dry prior to overlapping of adjoining sheets.

12. Probe laps using a clean, heated roofing trowel and heat fuse dry laps of the flashing membrane to ensure a complete seal.

B. Flashing Application - Masonry Surfaces: Flash masonry parapet walls and curbs using a reinforcing sheet with like reflective granule surfacing as the cap sheet. Foil faced flashings are not permitted. After the base ply has been applied to the top of the cant, fully adhere the reinforcing sheet, utilizing minimum three (3) inch side laps and extend a minimum of three (3) inches onto the base ply surface and three (3) inches up the parapet wall above the cant. Flashings shall be installed onto primed plywood surfaces, not masonry surfaces. After the final roofing ply has been applied to the top of the cant, prepare the surface area that is to receive flashing coverage by torch heating granular surfaces or by application of asphalt primer; allowing primer to dry thoroughly. Torch apply the flashing into place using three (3) foot widths, always lapping the factory selvage edge. Stagger the laps of the flashing layer from lap seams in the reinforcing layer. Extend the flashing sheet a minimum of four (4) inches beyond the toe of the cant onto the prepared surface of the finished roof and up the wall to the desired flashing height. Exert pressure on the flashing sheet during application to ensure complete contact with the wall/roof surfaces, preventing air pockets; this can be accomplished by using a damp sponge or shop rag. Check and seal all loose laps and edges. Secure top edge of flashing with term bar, fasteners six (6) inch centers at a minimum of 14” above finished roof surface. (See manufacturer's schematic for visual interpretation).

C. Flashing Application - Wood Surfaces: Flash wood or plywood parapet walls and curbs using the reinforcing sheet flashing membrane. The reinforcing sheet shall have minimum three (3) inch side laps and extend a minimum of three (3) inches onto the base ply surface and to the top of the parapet wall, curb, etc. Nail the reinforcing sheet through the field of the sheet to the vertical wood surface on 12 inch centers from the top of the cant to top of wall curb, etc. Fully adhere the remainder of flashing reinforcing sheet that extends over the cant and roof level. After the finish ply has been applied to the top of the cant, prepare the surface area that is to receive flashing coverage by torch heating granular surfaces or application of asphalt primer; allowing primer to dry thoroughly. Torch apply the flashing into place using three (3) foot widths (cut off the end of roll) always lapping the factory selvage edge. Extend the flashing sheet a minimum of four (4) inches beyond the toe of the cant onto the prepared surface of the finished roof and up the vertical surface to 14” in height. Exert pressure on the flashing sheet during application to ensure complete contact with the wall/roof surfaces, preventing air pockets; this can be accomplished by using a damp sponge or shop rag. Check and seal all loose laps and edges. Secure top edge of flashing with termination bar with fasteners six (6) inches on centers. (See manufacturer's schematic for visual interpretation).

D. Projection Flashings:
1. All penetrations shall be resin flashed with manufacturer’s proprietary liquid flashing product application with reinforcing.

E. Wall and Curb Flashings:
1. The flashing substrate shall be free of all dirt and loose material.
2. ¾” treated plywood is to be used at all parapets that receive wall flashings.
3. The underlayment ply or plies shall be brought to the top of the cant strip and adhered.
4. Starting on the roof at least six (6) inches from the roofside edge of the cant strip, adhere two (2) plies of flashing extending over the cant and up the vertical a minimum of fourteen (14) inches. Each lap of the ply sheet shall be a minimum of three (3) inches.

5. Starting two (2) inches past the flashing plies, install one (1) ply of SBS flashing membrane – torched. Laps shall not coincide with previously installed plies. The top of the SBS flashing shall be one (1) inch past the previously installed plies above the cant strip.
6. Fasten the top edge of the flashings on six (6) inch centers using approved termination bar and fasteners.
7. An NRCA-approved metal counterflashing shall extend down over the flashing a minimum of four (4) inches.
8. Cricket the up-side slope at all curb projections.

F. Perimeter Edge Flashing: Refer to Section 07 62 00.

3.8 OVERNIGHT SEAL / WATER CUT-OFF

A. Over Night Seal: Shall be performed according to accepted roofing practice as outlined in the NRCA Roofing Manual.

B. Water Cut-Off: At the end of day's work or when precipitation is imminent, construct a water cut-off at all open edges. Cut-offs can be built using asphalt or plastic cement and asphaltic roofing membranes, constructed to withstand protracted periods of service. Cut-offs must be completely removed prior to resumption of roofing.

3.9 ROOF SYSTEM INTERFACE WITH RELATED COMPONENTS

A. The following is a list of descriptions for correct installation of components integrated into the roof membrane assembly. In all cases, unless otherwise approved, incorporate flanged components into the system between the applications of the base ply and finish ply. The flange must be primed with a uniform coating of approved ASTM D41 asphalt primer and allowed to dry thoroughly; all flanges must be set in approved mastic.

B. Sealant: Caulk all exposed finish ply edges at gravel stops, waste stacks, pitch pans, vent stacks, etc., with a smooth continuous bead of approved sealant.

C. Sheet Metal: Refer to Section 07 62 00, ROOF RELATED SHEET METAL.

3.10 FIELD QUALITY CONTROL AND INSPECTIONS

A. Roof cuts shall be performed and repaired at contractor's expense. Cuts shall be made in the areas as indicated by the Architect's representative. Send required roof cuts to roof membrane manufacturer for laboratory examination. Roof cuts required by the Architect's representative shall be furnished to the Architect's representative for testing.

B. Remove not more than one (1) 12 inch x 12 inch cut per 5,000 square feet of roof area or fraction thereof.

C. Field audit will follow criteria outlined in current roof membrane manufacturer's Reference Manual.

D. Repair sampled areas with "feathered in" patch consisting of same number of plies as in the roof specification.

E. Correct deficiencies in roof as prescribed in current roof membrane manufacturer's Reference Manual and as approved by Architect's Representative.

3.11 CLEANING AND PROTECTION

A. Contractor shall keep the job clean and free from all loose materials and foreign matter. Contractor shall take necessary precautions to keep outside walls clean and shall allow no roofing materials to remain on the outside walls.

B. Leave all areas around job site free of trash, debris, roofing materials, equipment, and related items after completion of job.

C. All bituminous or roofing related materials shall be removed from ladders, stairs, railings, and similar parts of the building.

D. Remove bitumen stains from walls, walkways, and driveways.

END OF SECTION 07 52 19

SECTION 07 62 00 - ROOF RELATED SHEET METAL

PART I – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. It is the intent of this Section that the Work shall:
   1. conform to all applicable building code requirements and of authorities having jurisdiction.
   2. include all shop and field formed sheet metal work shown on drawings, specified or required, including, but not limited to:
      a. Roof penetration sleeves and hood and umbrella counterflashing
      b. Metal counterflashing
      c. Expansion joint
      d. Roof drains
      e. Scuppers
      f. Metal perimeter edge
      g. Gutters, Downspouts, Splash Blocks and Splash Pans
      h. One-way roof moisture relief vents
      i. Metal gravity vents
      j. Metal heat exhaust vents
      k. Sanitary vent pipes
      l. Pipe box
      m. Copings, trim and miscellaneous sheet metal accessories.
   3. be part of the Work of Section 07 52 19, Modified Bitumen Membrane Roofing System; and
   4. be performed by a single source contractor.

1.3 1.2 RELATED WORK

A. Section 07 52 19 - Modified Bitumen Membrane Roofing System

B. Section 07 72 00 - Roof Accessories

C. All Sections of Work relating to or affecting the roofing system, including mechanical, plumbing and electrical items.

1.4 REFERENCES

A. ASTM International (ASTM)
   1. A525, Standard Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
   2. A526, Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality
   3. A527, Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Lock-Forming Quality
   4. A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
   5. B32, Standard Specification for Solder Metal

6. C1107, Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

B. Federal Specifications (FS)
1. QQ-L-201

C. National Association of Architectural Metal Manufacturers (NAAMM)

D. National Roofing Contractors Association (NRCA)
1. Roofing and Waterproofing Manual

E. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)
1. Architectural Sheet Metal Manual

F. ANSI / SPRI ES-1: Fabricate and install sheet metal edge flashings and copings to comply with requirements of ANSI / SPRI ES-1 for 120 MPH wind speed zone and wind resistance loads.

1.5 SUBMITTALS

A. Product Data:
1. Manufacturer’s specifications and other data needed to prove compliance with specified requirements.
2. Manufacturer’s installation instructions.

B. Shop Drawings: Indicating sizes, configurations, details of attachment to related and adjacent work, materials, and finishes.

C. Samples:
1. Full range of finish colors for Architect's selection.
2. 12 inch long sample of each specified item with approved finish.
3. Provide full size mockup of all shop built assemblies.

1.6 QUALITY ASSURANCE

A. Single Source Responsibility: Fabricator and installer of roof-related flashing and accessories shall be the same as the membrane roof installer.

B. Comply with governing codes and regulations of authorities having jurisdiction.

1.7 INSTALLATION CONFERENCE

A. Refer to Section 01 31 13, Project Coordination.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver, handle and store materials in accordance with manufacturer's instructions.

B. Handle and store materials and equipment in such a manner as to avoid damage.

C. No storage of materials shall be permitted on roof areas other than those materials that are to be installed the same day. Any exception must be in written form. Do not place materials or equipment in such a manner as to overload structure.

1.9 WARRANTIES

A. Manufacturer's Product Warranty:
   1. Manufacturer's standard 20 year Kynar 500 or Hylar 5000 Finish warranty signed by the manufacturer, with guarantee covering any failure of the fluoropolymer finish during the warranty period.
   2. Failure is defined to include, but not be limited to:
      a. Deterioration of finish, such as fading, discoloring, peeling, cracking, corroding, etc.
   3. Correction may include repair or replacement of failed product.

B. Roofing Contractor's Warranty:
   1. Contractor shall warrant the sheet metal work and related work to be free from defects in workmanship and materials, and that the metal flashings will be and remain watertight, for a period of five (5) years from date of Substantial Completion.
   2. Defects shall include, but not be limited to:
      a. Leaking water or bitumen within building or construction.
      b. Becoming loose from substrate.
      c. Loose or missing parts.
      d. Finish failure as defined above.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

A. Manufacturers named within specification are approved for use on the Project providing:
   1. their products meet or exceed the specifications.
   2. company has a minimum of five (5) years experience manufacturing products of the type specified.
   3. products have been tested in conjunction with roofing membrane system as an assembly and as such has obtained the same approval and rating as the roofing membrane system; and
   4. products are approved for use by the roofing membrane manufacturer.

B. Substitutions shall be in accordance with Division 1 requirements regarding substitutions.

2.2 SHEET METAL MATERIALS

A. General Requirements: Roofing sheet metal system shall have been tested in conjunction with roofing membrane system as an assembly and have the same approval and rating as the roofing membrane system.

B. Prefinished Aluminum Sheet:
   1. Precoated type, aluminum conforming to Fed. Spec. QQ-A-250, ASTM B209.
   2. Thickness: Minimum 0.040 inch, except as otherwise indicated. SMACNA recommendations shall govern.
   3. Finish: Kynar 500, color as selected by Architect from manufacturer's full range of standard and premium colors.

C. Prefinished Galvanized Sheet Steel:
   1. Commercial quality ASTM A527 G-90 hot-dip galvanized coating designation.
   2. Thickness: Except as otherwise indicated, minimum 24 gauge. SMACNA recommendations shall govern.
   3. Finish: Kynar 500 or Hylar 5000 in color as selected by Architect from manufacturer's full range of standard and premium colors.

D. Sheet Lead:
   1. Comply with FS QQ-L-201, Grade B
      a. Four (4) pound minimum for use at roof drains and soil stacks.

E. Stainless Steel: ASTM A167, Type 302 / 304 Soft Temper, No. 2D finish. Minimum thickness 24 gauge, except as otherwise noted.

2.3 FASTENERS

A. Same metal as flashing/sheet metal or other non-corrosive metal or as noted below.

B. Exposed fasteners shall be self-sealing and gasketed for weathertight installation. (ZAC type).

C. Match finish of exposed heads with material being fastened.

D. Mechanical Fasteners:
   1. Nails: Stainless Steel Ring shank, minimum 1-1/2 inches in length with 1/2 inch diameter head.
   2. Washers: Steel washers with bonded rubber sealing gasket.
   3. Screws: Self-tapping sheet metal type of stainless steel or compatible with material being fastened, with hooded integral EPDM washers (ZAC type).
   4. Rivets: Stainless steel and cadmium plated material, closed end type of sizes recommended by sheet metal manufacturer to suit application.

E. Clips:
   1. Continuous Cleat (coping / fascia): Minimum 22 gauge, G-90 galvanized, stainless steel, or aluminum. Match material of coping/fascia and provide one (1) gauge heavier.

2.4 RELATED MATERIALS

A. Solder: ASTM B32, alloy grade 58, 50 percent tin, 50 percent lead.

B. Flux:
   1. Phosphoric acid type, manufacturer's standard.
      a. For Use with Steel or Copper: Rosin flux
      b. For Use with Stainless Steel: Acid-chloride type flux, except use rosin flux over tinned surfaces.

C. Underlayment:
   1. 48 mil minimum, non-reinforced, homogeneous, waterproof, impermeable elastomeric sheeting manufactured by Nervastral, Inc. or Lexsuco.

D. Adhesives: Type recommended by flashing sheet manufacturer seaming and adhesive application of flashing sheet to ensure adhesion and watertightness.

E. Metal Accessories: Sheet metal clips, straps, anchoring devices, clamps and similar accessories required for the complete installation of work, matching or compatible with material being installed, non-corrosive, size and gauge recommended by installer to suit application and performance.

F. Sealant:
   1. Type A:

a. Type: One-part, non-sag, moisture-curing polyurethane sealant.
b. Approved Products / Manufacturers: “Chem-Calk 900” manufactured by Bostik Construction Products Division, “Vulkem 921” manufactured by Mameco International, Inc., “Dynatrol I” manufactured by Pecora Corporation, “NP 1” manufactured by Sonneborn Building Products, or approved equal.

2. Type B:
a. Type: One-part, neutral-curing, medium-modulus silicone sealant for sealing metal to metal surfaces, i.e. metal edge, cover plates, etc.
b. Approved Products / Manufacturers: “Chem-Calk 1200” manufactured by Bostik Construction Products Division, ”795 Silicone Building Sealant” manufactured by Dow Corning Corporation, “895 Silicone” manufactured by Pecora Corporation, “Omniseal” manufactured by Sonneborn Building Products, “Spectrem 2” manufactured by Tremco Incorporated, or approved equal.

G. Grout - Pitch Pans:
1. Type: Quick-setting, non-shrink, non-metallic, high strength formula complying with ASTM C1107.
2. Approved Products / Manufacturers: “Sure Grip High Performance Grout” manufactured by Dayton Superior Corporation, “Premier Quick-Trim” manufactured by L & M Construction Chemicals, Inc., “Masterflow” manufactured by Master Builders, Inc., “Sonnogrout 10K” manufactured by Sonneborn Building Products, or approved equal.

H. Pitch Pan Filler:
1. Type: Pourable polyurethane sealer, approved by roofing system manufacturer.
2. Approved Products / Manufacturers: “Quick Pitch Sealer” manufactured by U.S. Intec, “SPM Pourable Sealer” manufactured by Johns Manville, or approved equal.

I. Termination Bar:
1. Material: Stainless steel or extruded aluminum bar with lipped profile
2. Size: 1/8 inch thick by one (1) inch wide with factory punched 1/4 inch x 3/8 inch oval holes spaced six (6) inches on center.
3. Approved Product / Manufacturer: “TB 125” manufactured by TruFast Corp. or approved equal.

J. Pipe Hangers and Supports: Refer to Section 07 72 00, Roof Accessories.

K. Splash Blocks: Concrete type, of size and profiles indicated; minimum 3,000 psi compressive strength at 28 days, with minimum five (5) percent air entrainment. Use at locations where roof drainage dumps on ground.

L. Splash Pans: 22-gauge stainless steel, of size and profiles indicated. Use at locations where roof drainage discharges over adjoining, lower roof level(s).

M. One-Way Moisture Relief Vents: Shall be fabricated from spun aluminum as recommended by Roofing Manufacturer.

2.5 FABRICATION

A. Except as otherwise indicated, fabricate work in accordance with SMACNA Architectural Sheet Metal Manual and other recognized industry practices and reviewed shop drawings. Form all flashings, receivers and counterflashings in accordance with standards set forth in the NRCA roofing manual and SMACNA.

B. Comply with Manufacturer's installation instructions and recommendations.

C. Unless noted otherwise, fabricate perimeter edge / fascia, scuppers, gutters, downspouts, copings, counterflashings, wind clips, and trim from pre-finished aluminum sheet steel.

D. Shop fabricate work to greatest extent possible. Fabricate inside and outside corners for metal edges, counterflashing, and coping caps of equal length – minimum 2'-0" lengths.

E. Fabricate items to size and dimensions as indicated on the drawings. Limit single-piece lengths to ten (10) feet.

F. Face of any fabricated vertical metal fascia or coping shall not exceed 8" without stiffener band or birds beak. If stiffener band or birds beak cannot be fabricated, contractor to use multiple pieces of metal to achieve overall distance without going over the 8" maximum per piece.

G. Fabricate for waterproof and weather-resistant performance; with expansion provisions for running work sufficient to permanently prevent leakage, damage or deterioration of the work.

H. Integrate flashing in a manner consistent with detailing. Form work to fit substrates.

I. Make angle bends and folds for interlocking metal with full regard for expansion and contraction to avoid buckling or fullness in metal after installation.

J. Fabricate items with straight lines, sharp angles, smooth curves, and true levels. Avoid tool marks, buckling, and oil canning.

K. Fold back edges on concealed side of exposed edge to form hem.

L. Unless noted otherwise, lap joints minimum one (1) inch. Rivet and solder joints on parts that are to be permanently and rigidly assembled.

M. Seams:
   1. Wherever possible, fabricate non-moving seams in sheet metal with flat-lock seams and end joints.
   2. Pre-finished Galvanized Steel: Seal pre-finished metal seams with rivets and silicone sealant.
   3. Metal Other than Aluminum: Tin edges to be seamed, form seams, and solder.

N. On Kynar 500 or Hylar 5000 pre-finished metal, surface sand metal flanges prior to applying any primers. Prime all metal in contact with bituminous material.

O. Backpaint all concealed metal surfaces with bituminous paint where expected to be in contact with cementitious materials or dissimilar metals.

P. Expansion Provisions: Where lapped or bayonet type expansion provisions in work cannot be used or would not be sufficiently waterproof or weatherproof, form expansion joints of intermeshing hooked flanges, not less than one (1) inch deep filled with mastic sealant concealed within joints.

2.6 FABRICATED ITEMS

A. Metal Flashings: (Minimum ten (10') foot lengths)

1. Through wall Receiver Tray: Minimum 24 gauge stainless steel, through wall receivers shall not extend past the face of the exterior veneer more than ¾".
2. Counterflashing: Minimum 24 gauge prefinished metal.

B. Wind Clips: Minimum 24 gauge stainless steel (or match material of counterflashing), one (1) inch wide by length to engage counterflashing a minimum of ½".

C. Roof Penetrations:
1. Umbrella Counterflashing: Two-piece construction of minimum 24 gauge stainless steel, fabricated in accordance with drawings or project requirements.
2. Pitch Pans:
   a. 24 gauge stainless steel.
   b. Fabricate to provide installed minimum clear inside perimeter dimension of two (2) inches on each side of penetrating element.
   c. Fabricate pans to at least six (6) inches above the finished roof membrane and with ¼" hem at top edge and with 4" flanges. Round all corners of flange.
   d. Fabricate metal bonnets for all pans, NO EXCEPTIONS. Fabricate bonnets with metal compatible with metal to which bonnet is to be attached. On beams and other steel, weld in place bonnets fabricated from ¼" steel plate. Draw band bonnets fabricated from 22 gauge stainless steel may be used on circular projections.

D. Metal Edge:
1. Minimum 24 gauge pre-finished metal formed in maximum 10'-0" lengths, with 6" wide cover plates of same profile, 4" flange, maximum 7" fascia, ¾" gravel stop.
2. Provide expansion slip joints at maximum 20'-0" on center.
3. Shop fabricate all interior and exterior corners. Fabricate exterior corners with 18" minimum to 4'-0" maximum legs. Lap, rivet, and seal prior to delivery to jobsite.
4. Fabricate to sizes and dimensions as indicated on drawings with a minimum 1" coverage past top of wall. Refer to SMACNA Fig. 2-5A.
5. Provide mock-up for Architect's approval prior to fabrication.

E. Continuous Cleats: Continuous strips, same material and profile, minimum one gauge heavier of item which cleats attach.

F. Vent Hoods, Sleeves, Penetration Flashings, and Accessories: Minimum 24-gauge stainless steel, or as shown or directed otherwise.

G. Angle Termination Bar: Aluminum pressure bar 1/8 inch x one (1) inch.

H. Vent Pipe Flashing: Four (4) pound lead. Provide proper size to fold down inside of pipe a minimum of 1".

I. Roof Drain Flashing: Four (4) pound lead, minimum 30" by 30".

J. Coping:
1. Minimum 24-gauge pre-finished metal, with six (6) inch wide cover plates of same profile.
2. Fabricate as outlined in SMACNA; Refer to Figure 3-4 A.
3. Provide tapered substrate to slope to one (1) side, and cover with waterproof membrane.
4. Install with continuous cleat one (1) side and fasten other side.

K. Gutters / Downspouts / Collector Heads:

1. Gutters and Downspouts: Minimum 24-gauge pre-finished metal formed in maximum 10'-0" lengths, with 6" wide cover plates. Minimum 5" by 6" box gutter (verify size meets rainfall data per SMACNA).
2. Gutter / Downspout Straps: Minimum 24-gauge pre-finished (match color) metal. Hem both sides.
3. Gutter Supports: Minimum 24-gauge pre-finished (match color) metal hemmed around 1/8 inch galvanized bent steel bracket.
4. Gutter Screen: Stainless steel ¼" diamond wire screen enclosed in a pre-finished frame.
5. Collector Heads: Minimum 24-gauge pre-finished (match color) metal. As outlined in SMACNA; Refer to Figure 1-25F and Figure 1-28 with alternate Section A-A.

L. Pipe Box Cover: 24-gauge stainless steel.

M. Heat Exhaust Curbs and Hoods: 22-gauge stainless steel.

N. Expansion Joint Cover: Minimum 24-gauge stainless steel (provide pre-finished metal at perimeter edge end termination.)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify substrates are smooth and clean to extent required to perform sheet metal work.

B. Verify roof openings, curbs, pipes, sleeves, ducts or vents through roof are solidly set in place.

C. Verify that reglets, nailers, cants, and blocking to receive sheet metal are in place and free of concrete and soil.

D. Do not start work until conditions are satisfactory.

3.2 PREPARATION

A. Field measure site conditions prior to fabrication work.

B. Install starter and edge strips and cleats before starting installation.

3.3 INSTALLATION

A. Install sheet metal with lines, arises, and angles sharp and true, and plane surfaces free from objectionable wave, warp, or buckle. Exposed edges of sheet metal shall be folded back to form ¼" hem on concealed side from view. Finished work shall be free from water retention and leakage under all weather conditions. Pre-fabricated corners or transitions are required at changes in direction, elevation, or plane and at intersections. Locate field joints not less than 12", nor more than 3'-0" from actual corner. Laps shall be 1", riveted and soldered at following locations:
1. Pre-fabricated corners;
2. transitions;
3. changes in direction, elevation, and plane; and
4. at intersections.

B. Anchor units of work securely in place to prevent damage or distortion from wind or buckling. Provide for thermal expansion of metal units; conceal fasteners wherever possible; and set

units true to line and level as indicated. Install work with laps, joints, and seams which are permanently watertight and weatherproof.

C. Install fabricated sheet metal items in accordance with manufacturer's installation instructions and recommendations and with SMACNA Architectural Sheet Metal Manual.

D. Separations: Provide for separation of metal from dissimilar metal or corrosive substrates by coating concealed surfaces with zinc chromate, bituminous coating, or other permanent separation at locations of contact as recommended by manufacturer or fabricator. Do not use materials which are incompatible with roofing system.

E. Continuous Cleat: At exposed edges of perimeter edge, fascias, cap flashings, and where required, attach continuous cleat at 6" o.c. with appropriate fasteners.

F. Gravel Guard / Fascia:
1. Install with expansion joints 10'-0" o.c., ½" expansion leeway, with cover plate.
2. Set in asphalt mastic and fasten into nailer at 3" o.c. staggered.
3. Buff sand Kynar surface of flange and prime.
4. Strip in flange with specified stripping plies set in hot bitumen extending 3" from outer edge of flange to at least 3" inward towards gravel stop. Provide finish stripping ply of modified bitumen base ply in hot bitumen extending 6" from the outer edge of the flange and butt base of gravel stop.

G. Counterflashing:
1. Do not use surface mount counterflashing except as noted in drawings.
2. Set in through wall with receiver and spring lock counterflashing, as detailed in drawings and to NRCA roofing manual, SMACNA standards.
3. Coordinate installation of through-wall flashing with the masonry contractor.
4. Seal through-wall in conjunction with masonry wall waterproofing.
5. Install wind clips 30" o.c. at all counterflashing over 5'-0" in length.

H. Pitch Pans, Metal Flanges:
1. Apply mastic under pitch pan or metal flashing flange at least 1/2 pound per linear foot.
2. Prime all metal flanges with asphalt primer prior to flashing installation.
3. Clean all projections enclosed in pitch pans in any manner suitable and coated with a rust inhibitive coating as approved by the Architect. Coating shall be allowed to dry prior to pitch pan fill.
4. Fill base of pitch pans with grout or cementitious binder and allow to cure.
5. Top Finish Fill: Self-leveling, one-part urethane; at least 2" to top of pitch pan sides.
6. Strip in pitch pan flanges with two strips of specified stripping plies set in hot bitumen extending 3" from the outer edge of the flange to at least 3" inward toward base of pitch pan. Provide finish stripping ply of SBS modified bitumen membrane in hot bitumen extending 6" from the outer edge of the flange and butt to base of pitch pan.

I. Sanitary Vent Stacks:
1. Prime top and bottom flanges of lead flashing sleeve. Set flange in uniform troweling of plastic roof cement. Prime top side of flange to receive strip-in membrane.
2. Fold lead sleeve down inside of pipe a minimum of 1". Apply a continuous bead of sealant on inside of pipe prior to folding lead sleeve.

J. Roof Drains:
1. After membrane installation, prime bottom of lead flashing sheet and set in uniform bed of plastic roof cement at specified locations.

2. Extend lead flashing into drain bowl or pipe a minimum of 2” and over top of piping / bowl connection, if possible. Apply a continuous bead of specified Type A sealant, at intersection of pipe and drain bowl.
3. If drain bowl and pipe connection is contaminated with bituminous material, strip-in area with three (3) coursing of plastic roof cement and fabric.
4. Prime top of lead flashing sheet to receive strip-in membrane.

K. Gutters / Downspouts:
1. Install gutters as detailed.
2. Install downspouts plumb and level, attached to columns or wall with straps located at top and bottom of downspout and maximum 10’-0” on center.
3. Install splash pad or block under discharge port of downspouts. Install splash pan over a protection (walkway) pad for downspouts located at roof level.
4. End caps, downspout outlets, gutter and downspout straps, support brackets and joint fasteners to be manufactured to suit profile and dimension of gutter and downspout.
5. Install all anchoring devices as outlined in SMACNA.
6. Expansion Joints: Lap or Butt type per SMACNA, locate every 50’-0” linear feet.

L. Expansion Joint:
1. Construct wood curbs as shown on drawings and as outlined in the NRCA and SMACNA Manuals.
2. Install underlayment, form envelope, and secure underlayment to curb. Fill envelope with compressible insulation.
3. Securely fasten expansion joint cover to curb with grommeted fasteners spaced 6” o.c.
4. Taper expansion joint down at the metal edge.

M. Coping:
1. Install wood nailers as shown on drawings.
2. Install metal cleats with appropriate fasteners spaced six (6) inches on center.
3. Install underlayment over the wood substrate. Lap ends minimum of six (6) inches and secure membrane in place. Seal laps with appropriate adhesive.
4. Install metal coping allowing ½” spaces between segments. Lock coping onto cleat and install appropriate fasteners through the interior fascia spaced 24” o.c. in enlarged holes.
5. Install cover plate centered over coping joint in continuous beads of specified Type B sealant, placed approximately 1” from cover edges. Refer to SMACNA for alternate joints as required by length.
6. Install appropriate fastener through neoprene washer and cover plate between coping segments.
7. Accommodate building wall expansion joints by terminating coping joints and cleats either side of expansion joint. Do not run coping or cleats continuous across joints. Install coping cover plate to span across joint and lap coping on each side of joint a minimum of 4”. Fasten cover plate on one (1) side of joint only. (Provide wall flashing membrane up and over parapet wall in accordance with manufacturer’s detail.)

3.4 CLEANING AND PROTECTION

A. Remove flux and residual acid immediately by neutralizing with baking soda and washing with clean water. Leave work clean of stains.

B. Remove scraps and debris and leave work area clean.

C. Clean exposed metal surfaces, removing substances which might cause corrosion of metal or deterioration of finishes. Paint areas where finish is damaged on pre-finished metal by painting with a compatible paint in color to match undamaged finish.

D. Prime soldered area of phosphatized metal after cleaning to prevent rusting.

E. Paint metal flashings that have been soiled with bitumen with aluminized paint.

F. Clean other work damaged or soiled by Work of this Section.

G. Protect finished work from damage.

END OF SECTION 07 62 00

SECTION 07 65 00 - FLEXIBLE FLASHING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. Provide flexible flashing where shown on drawings or required.

1.3 RELATED SECTIONS

A. Section 03 30 00 – Cast-In-Place Concrete
B. Section 04 20 00 – Unit Masonry
C. Section 07 27 26 – Fluid Applied Air Barrier System
D. Section 07 52 19 – Modified Bitumen “Cool Roof” Membrane Roofing System
E. Section 09 21 16 – Gypsum Wallboard Systems (Exterior Sheathing)

1.4 SUBMITTALS

A. Product Data:
   1. Manufacturer’s specifications and other data needed to prove compliance with specified requirements.
   2. Manufacturer’s installation instructions.

B. Certification: Manufacturer’s affidavit that materials used in Project contain no asbestos.

C. Compatibility: Submit letter from primary Fluid Applied Air Barrier System Manufacturer stating that materials proposed for use are permanently chemically compatible and adhesively compatible with adjacent materials proposed for use. Submit letter from Manufacturer stating that cleaning materials used during installation are chemically compatible with adjacent materials proposed for use.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

A. Manufacturers listed whose products meet or exceed the specifications are approved for use on the Project. Flexible flashing materials used shall be compatible with and not void any warranties of the air barrier system used. Other manufacturers must have a minimum of five (5) years’ experience manufacturing products meeting or exceeding the specifications and comply with Division 1 requirements regarding substitutions to be considered.

2.2 MATERIALS

A. Flashing:
   1. Copper Laminated Flashing (Contractor’s Option – in lieu of asphalt-free copper fabric flashing):
      a. Flashing: A full sheet of copper weighing five (5) ounces per square foot coated or bonded on both sides with one (1) of the following:
         1) Modified asphalt compound coated.

2) Asphalt saturated, waterproof glass fiber laminated fabric.

b. Approved Manufacturers:
   1) Advanced Building Products, Inc.
   2) Hohmann & Barnard, Inc.
   3) Sandell Manufacturing Company, Inc.
   4) York Manufacturing, Inc.

c. Mastic: Manufacturer recommended asphalt troweled mastic for sealing copper laminated flashings

2. Asphalt-free Copper Fabric Flashing (Contractor's Option – in lieu of copper laminated flashing):
   a. Glass fabric scrim bonded to a full sheet of copper for general through wall flashing as an alternative to asphalt coated copper specified above and where sealant compatibility is required. Provide manufacturers approved sealant or seam tape.
   b. Approved Product / Manufacturer: Multi-flash 500 as manufactured by York Manufacturing, Inc.; or Copper-Fabric NA or Copper-Fabric SA as manufactured by Hohmann & Barnard, Inc. (No substitutions).
3. Asphalt-free Stainless Steel Flexible Flashing (Contractor's Option – in lieu of copper laminated or asphalt-free copper fabric flashing):
   a. Flexible minimum 2 mil thickness, Type 304 stainless steel sheet with factory applied adhesive with a release liner on one side for general through wall flashing as an alternative to asphalt coated copper specified above and where sealant compatibility is required. Provide manufacturers approved sealant or seam tape.
   b. Approved Product / Manufacturer: York 304 as manufactured by York Manufacturing, Inc.; or Mighty-Flash-SA as manufactured by Hohmann & Barnard, Inc. (No substitutions).
4. Membrane Flashing:
   a. Self-Adhered Flexible Flashing: 40-mil, rubberized asphalt adhesive reinforced flashing with a high density cross laminated polyethylene film. Provide compatible substrate primer as instructed by Manufacturer.
   b. Approved Products / Manufacturers:
      1) "CCW-705 TWF" manufactured by Carlisle Coatings and Waterproofing
      2) "Perm-A-Barrier" manufactured by W. R. Grace & Co.
      3) "Blueskin TWF" manufactured by Henry Co.
      4) "Air-Shield Through wall flashing" manufactured by W.R. Meadows, Inc.
      5) ""TW-Thru Wall Flashing" manufactured by Tamko Waterproofing.
      6) AquaFlash 500" manufactured by Fiberweb.
5. Substrate Primer: Provide as instructed by Membrane Manufacturer.
6. Termination Bar: 14 ga. minimum thick by 1" minimum wide stainless steel, with pre-punched holes and ¼" minimum shouldered top flange. Provide with self-tapping screws.
7. **Metal Flashing at Door / Window Openings: Provide a 20 gauge (0.040") stainless steel or .040 aluminum 2"x3" weathering flange at head, jamb and under sill pan of storefront window and hollow metal door systems. Screw attaches into wood blockings or substrate walls and strip into air barrier system.**

PART 3 - EXECUTION

3.1 INSTALLATION

A. Flashing:

1. Follow manufacturer's instructions for mechanically fastened installation with a termination bar.
2. Application Guidelines - Install flashing at the following locations:
   a. Membrane Flashing: material transitions inside exterior cavity walls, roof edge / exterior wall transitions, masonry joints (control/expansion) inside exterior cavity walls, exterior door and window frame perimeters, roof deck / exterior wall transitions, exterior wall penetrations (i.e. pipe, conduit, ducts, etc.). Provide membrane at all joints, holes, gaps, or openings to ensure a continuously sealed building envelope. Utilize primer on substrates as instructed by manufacturer.

   b. Copper Flashing: At all horizontal wall flashing, including (but not limited to) exterior wall sill / weep conditions, exterior door and window head / weep conditions, intermediate and / or shelf angles, masonry wall cap flashing and masonry wall base flashing.
3. Apply substrate primer as instructed by membrane manufacturer to suit condition.
4. Provide drip edge flashing at weep conditions with membrane flashing. Cut ¼" to ½" behind with outside edge of brick over top of drip edge flashing to alleviate exposure to UV degradation and deterioration of asphalt membrane.
5. On Horizontal Surfaces: The flashing shall be laid in a slurry of fresh mortar and topped with a fresh full bed of mortar. The flashing shall be cut ¼" to ½" behind the exterior face of the wall after being left exposed for inspection purposes only. Flashing shall be carried through the wall, turned up where possible to facilitate drainage through the weepholes, then carried upward across the cavity a minimum of six (6) inches. Flashing will then be secured in back wall with termination bar.
6. On Vertical Surfaces: Surfaces receiving the flashing shall be sufficiently spotted with asphalt mastic to hold in place until masonry is set. Secure in back wall with termination bar.
7. Foundation Sill Dampproofing: The flashing for foundation sills shall be laid in a slurry of fresh mortar or in a full bed of mastic and topped with a fresh full bed of mortar. The flashing shall be cut ¼" to ½" behind the exterior face of the wall after being left exposed for inspection purposes only. Flashing shall be sloped across the cavity and turned up the wall a minimum of ten (10) inches and secured to back wall with termination bar. Where sill and column meet, flashing shall be brought up a minimum of ten (10) inches up the column.
8. Thru-Wall Flashing: Shall be cut ¼" to ½" behind the exterior face of the wall after being left exposed for inspection purposes only. Carry flashing through the wall, turned up where possible to facilitate drainage through the weepholes, then carried upward across the cavity a minimum of six (6) inches, unless noted otherwise, and secure in back wall with termination bar.
9. Lintel: Premolded or field molded end dams must be provided at each end of all lintels.
10. Cavity Wall: Flashing shall be laid in a slurry of fresh mortar and topped with a fresh full bed of mortar. Flashing shall be cut ¼" to ½" behind the exterior face of the wall after being left exposed for inspection purposes only. Flashing shall be carried through the wall and upward across the cavity a minimum of six (6) inches, unless noted otherwise, and secured in the back wall with termination bar. Vertical

membrane joints shall be secured with termination bar as instructed by membrane manufacturer.

11. Heads, Jambs and Sills: Flashing for heads and sills shall be cut ¼" to ½" behind the exterior face of the wall after being left exposed for inspection purposes only. Flashing shall be carried through the wall and upward across the cavity a minimum of six (6) inches, unless noted otherwise. Head flashing shall be carried six (6) inches beyond both end of the steel lintel. Both head and sill flashing shall be turned up at the sides to form a pan. All corners shall be folded, NOT CUT. Jambs are to be turned into the buildings to complete seal perimeter of window or door. Install weepholes.
12. Windows: wrap all heads, sills and jambs into opening with flexible flashings.
13. Wood blockings: Flexible flashings are to cover wood blockings in their entirety.
14. Spandrels: Spandrel flashing shall start from the outside toe of the shelf angle, go up the face of the beam and then through the wall, turned up on the inside not less than two (2) inches. Install weepholes.
15. Parapet or Coping: Flashing for parapets or coping sills shall be laid in a slurry of fresh mortar and topped with a fresh full bed of mortar. Flashing shall be cut ¼" to ½" behind the exterior face of the wall after being left exposed for inspection purposes only. Weepholes shall be installed immediately on top of the flashing.
16. Lengths: Install flashings without longitudinal joints within walls, if possible. If required materials are not available in a single width, join by lapping material minimum two (2) inches and seal joint throughout its length with adhesive.
17. End Joints: Avoid end joints in flashing. When end joints are necessary, lap flashing minimum six (6) inches and seal joint continuously with adhesive.
18. Penetrations: Where anchors, pipes, and inserts penetrate flashing, make opening in flashing snug and seal with adhesive.
19. Reglet Termination: Insert wedge into place and seal carefully with adhesive.
20. Termination Bar: Install flashing with termination bars in accordance with manufacturer's instructions. Provide 3 coursing at all termination bars, typical.
21. Topcoat: After flashing material is in place (except in masonry joints where bond and mortar is required) trowel full 1/8-inch protective coating or mastic on all flashing faces.
22. Lintels: Provide pre-molded end dams at all lintel ends.

B. Bed Joints: Coordinate work with Division 4, Masonry. Install thru-wall flashings between two (2) thin layers of masonry mortar without increasing thickness of mortar joint. Keep outer edge of flashing material back 3/4 inch from face of masonry.

3.2 APPLICATION

A. Protect membrane from overexposure to direct sunlight.

B. Follow manufacturer's recommendations for installation.

C. Adjacent Work: Protect work by masking, covering, or other precautionary methods. Remove protection when no longer necessary.

END OF SECTION 07 65 00

SECTION 07 71 23 - MANUFACTURED GUTTERS AND DOWNSPOUTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Pre-finished galvanized steel gutters and downspouts.
   2. Precast concrete splash pads.

1.3 REFERENCE STANDARDS

A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

C. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Comply with SMACNA (ASMM) for sizing components for rainfall intensity determined by a storm occurrence of 1 in 5 years.

B. Comply with applicable code for size and method of rainwater discharge.

C. Maintain one copy of each document on site.

1.5 SUBMITTALS

A. Refer to Section 01 33 00 - Submittal Procedures for submittal procedures.

B. Product Data: Provide data on prefabricated components.

C. Shop Drawings: Indicate locations, configurations, jointing methods, fastening methods, locations, and installation details.

D. Samples: Submit two samples, 6-inch-long illustrating component design, finish, color, and configuration.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope to drain.

B. Prevent contact with materials that could cause discoloration, staining, or damage.

1.7 WARRANTY

A. Manufacturer's Product Warranty:
   1. Manufacturer's standard 30-year finish warranty signed by the manufacturer, with guarantee covering any failure of the fluoropolymer finish during the warranty period.
   2. Failure is defined to include, but not be limited to:
      a. Deterioration of finish, such as fading, discoloring, peeling, cracking, corroding, etc.
   3. Correction may include repair or replacement of failed product as outlined in Warranty Documents
   4. Finish warranty and wind warranty shall be delivered by the Contractor to the Owner at the conclusion of project as part of project closeout documents.

B. Contractor’s Warranty:
   1. The Contractor shall warrant the installation and related work to be free from defects in workmanship and materials, and that the gutters, downspouts, and conductor heads will be and remain watertight and secure, for a period of five (5) years from date of Substantial Completion.

2. Defects shall include, but not be limited to:
    a. Leaking water on the exterior of the building, causing staining or discoloration of wall / exterior surface.
    b. Leaking water or bitumen within building or construction.
    c. Becoming loose from substrate / blocking.
    d. Loose or missing parts.
    e. Finish failure as defined above.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
    1. Gutters and Downspouts:
        a. Alside, Inc: www.alside.com/.
        b. ATAS International, Inc.: www.atas.com/.
        c. Cheney Flashing Company: www.cheneyflashing.com/.
        d. Drexel Metals Inc: www.drexmet.com/.
        e. Hickman Edge Systems: www.hickmanedgesystems.com/.
        f. Metal-Era, an MTL Company: www.metalera.com/.
        g. SAF Perimeter Systems, a division of Southern Aluminum Finishing Company, Inc: www.saf.com/persys/.
    2. Scupper and Collectors:
        a. ATAS International, Inc.: www.atas.com/.
        b. Metal-Era, an MTL Company: www.metalera.com/.

B. Substitutions: Refer to Section - 01 25 00 - Substitution Procedures.
    1. Manufacturers not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution.

2.2 MATERIALS

A. Pre-Finished Galvanized Steel Sheet: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 0.02 inch thick base metal.
    1. Finish: Shop pre-coated with modified silicone coating.
    2. Color: As indicated on Drawings.

2.3 COMPONENTS

A. Basis of Design: Seal-Tite Industrial Gutter IG-B manufactured by Metal-Era.

B. General Requirements:
    1. Minimum 24-gauge prefinished galvanized steel, formed in maximum 12 foot lengths.
    2. Verify gutter and downspout meets rainfall data as outlined in SMACNA.
    3. Install all anchoring devices as outlined in manufacturer literature.

C. Gutters:
    1. Profile as indicated on Drawings.
    2. Form in maximum lengths of 12 feet.
    3. Supply Drip Edge at gutter.
    4. For Single Ply roofing systems: Drip Edge with Factory Applied Flashing (PVC).
    5. Expansion Joints: Style 1 per manufacturer, locate every 50 linear feet.
    6. Gutter Straps and Supports: Minimum 3 per 12 foot length, 0.100 inch thick downspout straps: Strap type, like metal, match color.

D. Downspouts:
    1. Profile as indicated on Drawings.
    2. Downspouts: Minimum 24-gauge prefinished galvanized steel (match color).

E. Scuppers and Collectors:
   1. Profile as indicated on Drawings.
   2. Collector Heads: Minimum 24-gauge prefinished galvanized steel (match color). As outlined in SMACNA; Refer to Figure 1-25F and Figure 1-28 with alternate Section A-A.

F. Anchors and Supports:
   1. End Caps, Downspout Outlets, Gutter and Downspout Straps, Support Brackets, and joint fasteners to be manufactured to suit profile and dimension of gutter and downspout.
   2. Anchoring Devices: As recommended by fabricator.
   3. Gutter Supports: 2 inch Wide Gutter Straps at 24 inches o.c., Wind Straps 6 feet o.c.,1/8 inch Stainless Steel Pop Rivets, and #10 by 2 inch Stainless Steel Fasteners to be manufactured and supplied to suit profile and dimension of gutter and downspout by manufacturer.
   4. Downspout Supports: Strap type, like metal, match color.

G. Accessories:
   1. Splash Pads: Precast concrete type, size and profiles indicated; minimum 3,000 psi at 28 days, with minimum 5 percent air entrainment.

2.4 FABRICATION

A. Form gutters and downspouts of profiles and size(s) indicated on Drawings.

B. Fabricate with required connection pieces.

C. Form sections square, true, and accurate in size, in maximum possible lengths, free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.

D. Hem exposed edges of metal.

E. Fabricate gutter and downspout accessories; seal watertight.

2.5 FINISHES

A. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604, multiple coat, thermally cured fluoropolymer finish system; color as selected by Architect from manufacturer's standard colors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that surfaces are ready to receive work.

3.2 PREPARATION

A. Paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to a minimum dry film thickness of 0.015 inch.

3.3 INSTALLATION

A. Install gutters, downspouts, and accessories in accordance with manufacturer's instructions.

B. Sheet Metal: Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts and accessories.

C. Slope gutters as detailed.

D. Solder metal joints for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.

E. Set splash pans under downspouts.

END OF SECTION 07 71 23

SECTION 07 72 00 - ROOF ACCESSORIES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 INSTALLATION RESPONSIBILITY

A. In addition to the items normally a part of this Section, coordinate the installation of roof accessory curbs and pipe flashings and equipment supports that may be specified elsewhere.

B. Coordinate the Work specified herein with the following Work:
   1. Roofing
   2. Roofing sheet metal
   3. Mechanical equipment
   4. Plumbing
   5. Electrical

1.3 REFERENCES

A. Federal Specifications (FS)
   1. TT-S-00227E

B. National Roofing Contractors Association (NRCA)

C. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)
   1. Architectural Sheet Metal Manual

1.4 SUBMITTALS

A. Product Data: Submit schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, product variations, and accessories.

B. Shop Drawings: Indicate size, material, and finish. Show locations and installation procedures. Include details of joints, attachments, and clearances.

1.5 PRE-INSTALLATION CONFERENCE

A. A Pre-Installation conference is to be held in conjunction with the modified bitumen roof system pre-install.

1.6 WARRANTY

A. Warranty the Work specified herein for one (1) year against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials and workmanship.

B. Defects shall include, but not be limited to, the following:
   1. Noticeable deterioration of finish
   2. Water infiltration into the building or within the construction.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Specifications are based on products of named manufacturers. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 1 requirements regarding substitutions to be considered.

2.2 PREFABRICATED ROOF CURBS (REFERENCE MEP FOR PREFABRICATED CURBS ALSO)

A. Frames: (Knock-down curbs not permitted. Welded curbs only)
   1. Material: ASTM A 653 G90 hot-dipped galvanized steel.
      a. Minimum 18 gauge, and as engineered by manufacturer.
      b. Minimum 18 gauge for curbs supporting HVAC units
      c. Minimum 20 gauge for expansion joint curbs.
   2. Corners: Mitered and welded (welds are micro sealed and prime painted after fabrication). Bolted connections not accepted.
   3. Base Plates: Integral to frame and welded.
   4. Internally reinforced with galvanized 1 inch by 1 inch by 12 gauge angles for curbs exceeding 3 foot length. Reinforce internal bulkhead at equipment curbs to support lateral loads.
   5. Wood Nailers: Factory installed, pressure treated. Size and width as suitable for support of items installed on curbs.

B. Insulation: Factory installed 1-1/2 inch thick three-pound density fiberglass insulation.

C. Curb Height: Minimum fourteen (14) inches above finished roof.
   1. Construct curbs to match roof slope with plumb and level top surface for mounting mechanical equipment.

D. Gasketing: 1/4 inch thick, one (1) inch wide at roof top units.

E. Counterflashing: 24 gauge stainless steel

F. Counterflashing Cap: Stainless steel.

G. Cants:
   1. Non-canted curb style installs either under or on top of metal decks with insulation.
   2. Cants shall be provided under Section 07 52 19 – Roofing

H. All insulated roof curbs shall be structural and shall include calculations signed and sealed by a registered Structural Engineer. Refer to installation drawings for any additional structural requirements. If curbs do not span a minimum of two bar joists, only two angles will be required. Coordination mechanical equipment weight loading on the roof with Structural Engineer.

I. Approved Manufacturers:
   1. Custom Curb, Inc.
   2. Roof Products, Inc.

2.3 PIPE SUPPORTS (Contractor built supports are not allowed)

A. Gas Pipe Supports:
   1. Provide pipe roller type support with bases of high density / high impact injection molded polypropylene with UV inhibitors (10” x 16” x 3”; 5.5 lbs. each) and stainless steel rods, washers and nuts; Basis of design, PHP Systems / Design Model PP10-R with roller for gas pipe 3” O.D. and smaller.
   2. Provide hanger type support with bases of high density / high impact injection molded polypropylene with UV inhibitors (12” x 12” x 3”; 3 lbs. each or 18” x 18” x 3”; 7 lbs. each or 18” round; 10.5 lbs. each) and stainless steel rods, washers and nuts; Basis of design, PHP Systems / Design Model PS-1-2 with hanger for gas pipe larger than 3” O.D.
   3. Acceptable Manufacturers: Miro Industries Inc.; MAPA Products; Advanced Support Products, nVent Caddy or Architect approved equal.

B. Electrical Conduit / Condensate Pipe Supports:
   1. Provide channel / strut type support with bases of high density / high impact injection molded polypropylene with UV inhibitors (10” x 16” x 3”; 5.5 lbs. each) and stainless steel channel, rods, washers and nuts; Basis of design, PHP Systems / Design Model PP10-C with channel for condensate pipe or conduit 3” O.D. and smaller.
   2. Provide hanger type support with bases of high density / high impact injection molded polypropylene with UV inhibitors (12” x 12” x 3”; 3 lbs. each or 18” x 18” x 3”; 7 lbs. each or 18” round; 10.5 lbs. each) and stainless steel rods, washers and nuts; Basis of design, PHP Systems / Design Model PS-1-2 with hanger for condensate pipe or conduit larger than 3” O.D. Contractor to provide channel clamp at each support. Provide dissimilar metal protection as required.
   3. Acceptable Manufacturers: Miro Industries Inc.; MAPA Products; Advanced Support Products, nVent Caddy or Architect approved equal.

C. Chilled Water Pipe Supports:
   1. Provide hanger type support with bases of high density / high impact injection molded polypropylene with UV inhibitors (18” x 18” x 3”; 7 lbs. each or 18” round; 10.5 lbs. each) and stainless steel rods, washers and nuts; Basis of design, PHP Systems / Design Model PS-1-2 or Model PS-2-2 or Model PSE Custom as required with hanger(s) for chilled water pipe of any diameter.
   2. Acceptable Manufacturers: Miro Industries Inc.; MAPA Products; Advanced Support Products, nVent Caddy or Architect approved equal.

D. Crossover / Steps Pipe Supports:
   1. Provide channel / strut type support with bases of high density / high impact injection molded polypropylene with UV inhibitors and stainless steel channel, rods, washers and nuts; Basis of design, PHP Crossover.
   2. Acceptable Manufacturers: Miro Industries Inc.; MAPA Products; Advanced Support Products, nVent Caddy or Architect approved equal.

E. Installation:
   1. Provide pipe supports at no greater than 8’-0” o.c. or as otherwise indicated in Manufacturer’s Shop Drawings.
   2. Provide pipe supports spaced so deflection of piping does not exceed 1/240 of span. If deflection exceeds 1/240 of span, decrease support spacing to 6’-0” o.c.
   3. Provide complete and adequate support of all piping, ducts and conduit.

4. Provide protective isolation pads adhered to the roof system below each pipe support using Roof System Manufacturer's approved adhesive.
5. Provide each pipe support adhered to the protective isolation pads using Roof System Manufacturer's approved adhesive.

2.4 ROOF TO ROOF EXPANSION JOINT

A. Stainless Steel expansion joint covers on new wood curbs, as detailed on drawings and outlined the NRCA and SMACNA manual.

2.5 ROOF PENETRATION HOUSING

A. Provide rain-proof our-piece configuration consisting of a removable vandal resistant lid, middle housing, insulation extension (ICE) and wide flanged curb that is light weight and water tight. To be used with our exclusive two-piece aluminum and / or stainless steel flanged Exit Seal with SilX14TM gasket. Provide 20 Year insured warranty.

B. As manufactured by Roof Penetration Housing Model AWI Series Vault as required for condition or Architect approved equal.

2.6 PLUMBING PEDESTAL HYDRANT

A. Provide freeze-proof pedestal hose station / hydrant with stainless steel shroud, welded stainless steel flange, black powder coated cast aluminum dome handle, mail hose fitting and vacuum breaker. Provide powder coated under-deck support flange with hardware. Provide for dissimilar metal protection.

B. As manufactured by MAPA Products Model MPH-24D:24/9 Pedestal Hydrant as required for condition or Architect approved equal.

2.7 ELECTRICAL PEDESTAL DISCONNECT / OUTLET

A. Provide rain-proof pedestal disconnect with stainless steel square tubing and welded stainless steel flange. Provide powder coated under-deck support flange with hardware. Provide for dissimilar metal protection.

B. As manufactured by MAPA Products Model MPD-(XX) Pedestal Disconnect as required for condition or Architect approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install roof accessories in accordance with manufacturer's printed instructions and approved shop drawings. Installation of Portable Pipe Hangers shall not exceed six (6) feet on center.

B. Coordinate with roofing operation for watertight integrity.

C. Finished installation shall be water and air tight. Install sealant conforming to FS TT-S-00227E, Type II, Class A.

END OF SECTION 07 72 00

SECTION 07 72 33 - ROOF SCUTTLE (HATCHES)

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 RELATED WORK

A. Section 05 31 00 - Metal Floor Decking

B. Section 05 50 00 – Metal Fabrications

C. Section 06 10 00 - Rough Carpentry

D. Section 07 52 19 – Modified Bitumen Membrane Roofing System

1.3 COORDINATION

A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a watertight installation.

B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.4 SUBMITTALS

A. Product Data: Submit schedules, charts, literature and illustrations to indicate the performance, fabrication procedures, product variations, and accessories.

B. Shop Drawings: Include materials, opening sizes, fabrication details, hardware, attachments, related and adjacent work, and finishes.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Miami-Dade County, FL Approved NOA
    a. TAS 201 Impact test
    b. TAS 202 Uniform Static Air Pressure
    c. TAS 203 Cyclic Wind Pressure Loading
2. OSHA 29 CFR 1910.23 Guarding floor and wall openings and holes
3. OSHA 29 CFR 1926.502 Fall protection systems criteria
4. International Building Code (IBC) Section 1013.6 Roof Access
5. International Building Code (IBC) Section 1009.11 Means of Egress, Stairways, Stairway to Roof
6. International Building Code for venting requirements
7. IBC Section 410 for Stages and Platforms
8. IBC Section 910 for Factory and Storage occupancies
9. IBC Section 1207 Sound Transmission
10. ASTM E 90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to Project site ready use.

B. Exercise proper care in handling of Work so as not to disrupt finished surfaces.

C. Store materials under cover in a dry and clean location off the ground.

1.7 WARRANTY

A. Warrant the work specified herein for five (5) years, against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials and workmanship.

B. Defects shall include, but not be limited to, the following:
   1. Faulty, improper or inadequate attachment or installation.
   2. Difficult or noisy operation.
   3. Noticeable deterioration of finish.
   4. Leakage of water into the building or within the construction.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Basis of Design Product: Subject to compliance with requirements: The Bilco Company.

B. Manufacturers listed below whose products are equivalent to those specified are approved for use on the Project. Other manufacturers must have a minimum of five (5) years' experience manufacturing equivalent products to those specified and comply with Division 1 requirements regarding substitutions to be considered.
   1. SafePro products
   2. Acudor Products Inc.
   3. Babcock-Davis Hatchways, Inc.
   4. Dur-Red Products
   5. J. L. Industries, Inc.
   6. Karp Associates, Inc.
   7. Nystrom Building Products

2.2 ROOF SCUTTLES (HATCHES)

A. Size: 2'-6" x 3'-0" unless shown otherwise.

B. Finish: Mill Finish Aluminum White Powder Coat Aluminum.

C. Thermally Broken Cover: Shall be 11-gauge aluminum with 3" concealed polyisocyanurate insulation, 5" beaded, overlapping flange, fully welded at corners, and internally reinforced for 40 psf live load., fully covered and protected by an aluminum liner. No water standing on top of the cover will be permitted.

D. Thermally Broken Curb: Shall be 12 inches in height above finished roof surface and constructed of 11 gauge aluminum. It shall be formed with a 5-1/2 inch flange with holes provided for securing to the roof deck. Curb shall be equipped with an integral metal capflashing of the same gauge and material as the curb, full welded at the corners for weathertightness. Capflashing shall be equipped with the Bilclip™ flashing system,

including stamped tabs and Pak-Rope. Insulation on the exterior of the curb shall be rigid fiber board three (3) inches in thickness.

E. Thermally Broken Scuttle (Hatch): Shall be completely assembled with heavy pintle hinges, positive snap latch with turn handles, padlock hasps inside and outside, and a mechanically retained thermoplastic rubber gasket. Compression spring operators enclosed in telescopic tubes shall be provided for smooth, easy and controlled door operation throughout the entire arc of opening and closing. Operation shall not be affected by temperature. Cover shall be equipped with an automatic hold-open arm complete with red vinyl grip handle to permit easy release and one-hand control of the cover to its closed and latched position. All hardware shall be stainless steel. Gasket shall be extruded EPDM adhesive back seal and continuous around cover.

F. Approved Model / Manufacturer: Type No. “S-50TB” Roof Scuttles (Hatches) for ladder access, or Architect approved equal.

G. Roof Access Ladder (required): As specified in Section 05 50 00, Miscellaneous Metals. Ladder shall be oriented and mounted along the short dimension of the hatch.

H. Fall Protection Safety Rail (required): 30”x36” Model SP 3036 manufactured by **SafePro L.C.** Guardrail height shall be 42” above finished roof surface. Color shall be powder coated safety yellow.

I. Folding Fall Protection Safety Rail: Aluminum guardrail system [30”x36”] Model by Precision Ladders LLC. Guardrail height shall be 42” above finished roof surface. Color shall be powder coated safety yellow.

J. Telescoping Ladder Safety Post (required): Model ER-1 Extend-A-Rail Ladders Safety Post as manufactured by Precision Ladders LLC. 1.62” OD Schedule 40 anodized aluminum pipe post and 16”x4”x¼” aluminum mounting plate. Provide with locking slot and knob. All mounting hardware shall be Type 316 stainless steel.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Coordinate installation of sealant and roofing cement with Work of this Section to ensure water tightness.

B. Coordinate installation of components of this Section with installation of roof deck, roof structure, roofing membrane, and base flashing.

C. Roof hatches shall be welded to structural steel frame of building.

D. Install hatches in accordance with details on drawings, approved shop drawings, and manufacturer’s instructions.

E. Set units plumb, level, and true to line without warp or rack. Separate metal from incompatible metal or corrosive substrates, including wood, by coating concealed surfaces, at locations of contact, with bituminous coating or providing other permanent separation.

F. Flange Seals: Unless otherwise indicated, set flanges of accessory units in a thick bed of roofing cement to form a watertight and airtight seal.

3.3 ADJUSTING

A. Adjust movable parts for smooth operation.

B. Operational Units: Test-operate units with operable components. Clean and lubricate joints and hardware. Adjust for proper operation

3.4 CLEANING

A. Clean exposed surfaces per manufacturer's written instructions. Touch up damaged metal coatings.

END OF SECTION 07 72 33

SECTION 07 81 16 - CEMENTITIOUS FIREPROOFING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: Requirements including but not limited to:
   1. Sprayed fire-resistive materials.
   2. Accessories necessary for a complete installation.

1.3 RELATED SECTIONS

A. Section 07 21 00 “Thermal Insulation.”

B. Section 07 81 23 “Intumescent Fireproofing.”

1.4 REFERENCE STANDARDS

A. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

C. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.

D. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 °C; 2022.

E. ASTM E605/E605M - Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members; 2019 (Reapproved 2023).

F. ASTM E736/E736M - Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members; 2019 (Reapproved 2023).

G. ASTM E759/E759M - Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members; 1992 (Reapproved 2023).

H. ASTM E760/E760M - Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members; 1992 (Reapproved 2023).

I. ASTM E761/E761M - Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members; 1992 (Reapproved 2023).

J. ASTM E859/E859M - Standard Test Method for Air Erosion of Sprayed Fire-Resistive Materials (SFRMs) Applied to Structural Members; 2023.

K. ASTM E937/E937M - Standard Test Method for Corrosion of Steel by Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members; 1993 (Reapproved 2023).

L. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).

M. UL 263 - Standard for Fire Tests of Building Construction and Materials; Current Edition, Including All Revisions.

1.5 DEFINITIONS

A. SFRM: Sprayed fire-resistive materials.

1.6 PERFORMANCE REQUIREMENTS

A. Assemblies: Provide fireproofing, including auxiliary materials, according to requirements of each fire-resistance design and manufacturer's written instructions.

B. Fire Resistance Design: Indicated on Drawings, tested according to ASTM E119 or UL 263; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Consider steel members unrestrained unless specifically noted otherwise.

C. Asbestos: Provide products containing no detectable asbestos.

1.7 SUBMITTALS

A. Product Data: Technical data, installation instructions, and UL listing for each type of product.

B. Shop Drawings: Framing plans or schedules, or both, indicating the following:
   1. Extent of fireproofing for each construction and fire resistance rating.
   2. Applicable fire resistance design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
   3. Minimum fireproofing thickness necessary to achieve required fire resistance rating of each structural component and assembly.
   4. Treatment of fireproofing after application.

C. Samples: Submit for each exposed product and for each color and texture specified, 4 inches (102 mm) square in size.

D. Product Certificates and Reports:
   1. Certificates: Submit manufacturer’s precut certificates for each type of SFRM.
   2. Evaluation Reports: Submit ICC-ES evaluation report.
   3. Compatibility and Adhesion Test Reports: From SFRM manufacturer indicating:
      a. Materials have been tested for bond with substrates.
      b. Materials have been verified by SFRM manufacturer to be compatible with substrate primers and coatings.
      c. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
   4. Preconstruction test reports.
   5. Field quality control reports.

1.8 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Building Code: Comply with applicable provisions of the IBC for fire protection.
   2. Fire Resistance Design: Indicated on Drawings, tested according to ASTM E119 or UL 263 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency. Steel members are to be considered unrestrained unless specifically noted otherwise.
   3. Surface Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
      a. Flame Spread Index: 10 or less.
      b. Smoke Developed Index: 10 or less.
   4. Hazardous Materials: Provide products containing no detectable asbestos as determined according to the method specified in 40 CFR 763, Subpart E, Appendix E, Section 1, Polarized Light Microscopy.

B. Installer Qualifications: A firm or individual having minimum 5 years documented experience who is certified or licensed and qualified by fireproofing manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements.

C. Source Limitations: Obtain fireproofing for each fire resistance design from single source.

D. Pre-Construction Adhesion and Compatibility Testing: Test for compliance with requirements for specified performance and test methods.
   1. Bond Strength: Test for cohesive and adhesive strength according to ASTM E736/E736M. Provide bond strength indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.

2. Density: Test for density according to ASTM E605/E605M. Provide density indicated in referenced fire-resistance design, but not less than minimum specified.
3. Verify that manufacturer, through its own laboratory testing or field experience, attests that primers or coatings are compatible with fireproofing.
4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
5. For materials failing tests, obtain applied-fireproofing manufacturer's written instructions for corrective measures including the use of specially formulated bonding agents or primers.

E. Pre-Installation Conference: Conduct conference at site.
1. Review products, design ratings, restrained and unrestrained conditions, densities, thicknesses, bond strengths, and other performance requirements.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in original, unopened packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, shelf life, and fire resistance ratings applicable to Project.

B. Use materials with limited shelf life within period indicated. Remove from site and discard materials whose shelf life has expired.

C. Store materials inside, under cover, and aboveground; keep dry until ready for use. Remove from site and discard wet or deteriorated materials.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not apply fireproofing when ambient or substrate temperature is 44 degrees F or lower unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.

B. Ventilation: Ventilate building spaces during and after application of fireproofing, providing complete air exchanges according to manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fireproofing dries thoroughly.

1.11 COORDINATION

A. Sequence and coordinate application of sprayed fireproofing with related work to comply with requirements:
1. Provide temporary enclosure as required to confine spraying operations and protect the environment.
2. Provide temporary enclosures for applications to prevent deterioration of fire resistive material due to exposure to weather and to unfavorable ambient conditions for humidity, temperature, and ventilation.
3. Avoid unnecessary exposure of fire resistive material to abrasion and damage likely to occur during construction operations subsequent to its application.
4. Do not apply fire resistive material to metal roof deck substrates until concrete topping, if any, has been completed. For metal roof decks without concrete topping, do not apply fire resistive material to metal roof deck substrates until roofing has been completed; prohibit roof traffic during application and drying of fire resistive material.
5. Do not apply fire resistive material to metal floor deck substrates until concrete topping has been completed.
6. Do not begin applying fire resistive material until clips, hangers, supports, sleeves, and other items penetrating fire protection are in place.
7. Defer installing ducts, piping, and other items that would interfere with applying fire resistive material until application of fire protection is completed.
8. Do not install enclosing or concealing construction until after fire resistive material has been applied, inspected, and tested and corrections have been made to defective applications.

1.12 WARRANTY

A. Written warranty signed by manufacturer, installer, and Contractor in which manufacturer agree to repair or replace fireproofing materials that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Cracking, flaking, spalling, or eroding in excess of specified requirements; peeling; or delaminating of SFRM from substrates.
      b. Not covered under the warranty are failures due to damage by occupants and Owner's maintenance personnel, exposure to environmental conditions other than those investigated and approved during fire response testing, and other causes not reasonably foreseeable under conditions of normal use.
   2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Manufacturers: Manufacturers listed whose products meet or exceed the specifications are approved for use on the Project. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.
   1. Carboline Company; a subsidiary of RPM International.
   2. Grace Construction Products.
   3. Islolatek International.
   4. Southwest Fireproofing Products Co.

B. Sprayed Fire-Resistive Material): Factory-mixed, lightweight, dry-formulation, complying with indicated fire resistance design, and mixed with water at site to form a slurry or mortar before conveyance and application.
   1. Application: Designated for exterior use by qualified testing agency acceptable to authorities having jurisdiction.
   2. Bond Strength: Minimum 150 lbf/sq. ft. cohesive and adhesive strength based on field testing according to ASTM E736/E736M.
   3. Density: Not less than density specified in the approved fire resistance design, according to ASTM E605/E605M.
   4. Thickness: As necessary required for fire resistance design indicated, measured according to requirements of fire resistance design or ASTM E605/E605M, whichever is thicker, but not less than 0.375 inch.
   5. Combustion Characteristics: ASTM E136 .
   6. Compressive Strength: Minimum 10 lbf/sq. in.) according to ASTM E761/E761M.
   7. Corrosion Resistance: No evidence of corrosion according to ASTM E937/E937M.
   8. Deflection: No cracking, spalling, or delamination according to ASTM E759/E759M.
   9. Effect of Impact on Bonding: No cracking, spalling, or delamination according to ASTM E760/E760M.
   10. Air Erosion: Maximum weight loss of 0.025 g/sq. ft. in 24 hours according to ASTM E859/E859M.
   11. Fungal Resistance: Treat products with antimicrobial formulation to result in no growth on specimens per ASTM G21 or rating of 10 according to ASTM D 3274 when tested according to ASTM D3273.
   12. Finish: Spray textured finish unless otherwise indicated.

C. Auxiliary Materials: Provide auxiliary materials compatible with fireproofing and substrates and approved by UL for use in fire resistance designs indicated.
   1. Substrate Primers: Primers approved by fireproofing manufacturer and complying with requirements:

a. Primer and substrate are identical to those tested in required fire-resistance design by UL.
b. Primer bond strength in required fire resistance design complies with specified bond strength for fireproofing and with requirements in UL Fire Resistance Directory, based on a series of bond tests according to ASTM E736/E736M.

2. Bonding Agent: Product approved by fireproofing manufacturer and complying with requirements in UL Fire Resistance Directory.
3. Metal Lath: Expanded metal lath fabricated from material of weight, configuration, and finish required, according to fire resistance designs indicated and fireproofing manufacturer's written instructions. Include clips, lathing accessories, corner beads, and other anchorage devices required to attach lath to substrates and to receive fireproofing.
4. Reinforcing Fabric: Glass or carbon fiber fabric of type, weight, and form required to comply with fire resistance designs indicated; approved and provided by fireproofing manufacturer.
5. Reinforcing Mesh: Metallic mesh reinforcement of type, weight, and form required to comply with fire resistance design indicated; approved and provided by fireproofing manufacturer. Include pins and attachment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions for compliance with requirements for substrates and conditions affecting performance of the work and according to each fire resistance design.
   1. Verify substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or other foreign substances capable of impairing bond of fireproofing with substrates under conditions of normal use or fire exposure.
   2. Verify objects penetrating fireproofing, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
   3. Verify substrates receiving fireproofing are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fireproofing application.
   4. Verify concrete work on steel deck is complete before beginning fireproofing work.
   5. Verify roof construction, installation of rooftop HVAC equipment, and related work are complete before beginning fireproofing work.
   6. Conduct tests according to fireproofing manufacturer's written instructions to verify that substrates are free of substances capable of interfering with bond.
   7. Prepare written report listing conditions detrimental to performance of the work.
   8. Proceed with installation after correcting unsatisfactory conditions.

B. Conduct tests according to fireproofing manufacturer's written recommendations to verify substrates are free of substances capable of interfering with bond.

C. Prepare written report listing conditions detrimental to performance of the work.

D. Proceed with installation after correcting unsatisfactory conditions.

3.2 PREPARATION

A. Cover adjacent work subject to damage from fallout or overspray of fireproofing materials during application. Clean substrates of substances that could impair bond of fireproofing.

B. Prime substrates where included in fire-resistance design and where recommended in writing by fireproofing manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fireproofing.

C. For applications visible on completion of Project, repair substrates to remove surface imperfections that could affect uniformity of texture and thickness in finished surface of fireproofing. Remove minor projections and fill voids that would telegraph through fire-resistive products after application.

3.3 APPLICATION

A. Construct fireproofing assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, sealers, topcoats, finishing, and other materials and procedures affecting fireproofing work.

B. Comply with fireproofing manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fireproofing; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.

C. Coordinate application of fireproofing with other construction to minimize need to cut or remove fireproofing.
   1. Do not begin applying fireproofing until clips, hangers, supports, sleeves, and other items penetrating fireproofing are in place.
   2. Defer installing ducts, piping, and other items that would interfere with applying fireproofing until application of fireproofing is completed.

D. Metal Decks:
   1. Do not apply fireproofing to underside of metal deck substrates until concrete topping, if any, is completed.
   2. Do not apply fireproofing to underside of metal roof deck until roofing is completed; prohibit roof traffic during application and drying of fireproofing.

E. Install auxiliary materials as required, as detailed, and according to fire-resistance design and fireproofing manufacturer's written instructions for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by fireproofing manufacturer.

F. Spray apply fireproofing to maximum extent possible. After the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by fireproofing manufacturer. Extend fireproofing in full thickness over entire area of each substrate to be protected.

G. Install body of fireproofing in a single course unless otherwise recommended in writing by fireproofing manufacturer.
   1. For applications over encapsulant materials, including lockdown (post removal) encapsulants, apply fireproofing that differs in color from that of encapsulant over which it is applied.
   2. Where sealers are used, apply products that are tinted to differentiate them from fireproofing over which they are applied.

H. Provide a uniform finish complying with description indicated for each type of fireproofing material and matching finish approved for required mockups.
   1. Cure fireproofing according to fireproofing manufacturer's written instructions.

I. Do not install enclosing or concealing construction until after fireproofing has been applied, inspected, and tested and corrections have been made to deficient applications.

J. Cure fireproofing according to fireproofing manufacturer’s written instructions.

K. Finishes: Where indicated, apply fireproofing to produce the following finishes:
   1. Standard Finishes: Finish according to manufacturer's written instructions for each finish selected.
   2. Spray Textured Finish: Finish left as spray applied with no further treatment.
   3. Rolled, Spray Textured Finish: Even finish produced by rolling spray applied finish with a damp paint roller to remove drippings and excessive roughness.
   4. Skip Troweled Finish: Even leveled surface produced by troweling spray applied finish to smooth out the texture and neaten edges.
   5. Skip Troweled Finish with Corner Beads: Even, leveled surface produced by troweling spray applied finish to smooth out the texture, eliminate surface markings, and square off edges.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
   1. Test and inspect as required by the IBC, Subsection 1705.13 and indicated in Schedule of Special Inspections.

B. Perform the tests and inspections of completed work in successive stages. Do not proceed with application of fireproofing for the next area until test results for previously completed applications of fireproofing show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire resistance design.

C. Fireproofing will be considered defective if it does not pass tests and inspections.
   1. Remove and replace fireproofing that does not pass tests and inspections, and retest.
   2. Apply additional fireproofing, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.

D. Prepare test and inspection reports.

3.5 CLEANING, PROTECTING, AND REPAIRING

A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

B. Protect fireproofing, according to advice of manufacturer and Installer, from damage resulting from construction operations or other causes, so fireproofing is without damage or deterioration at time of Substantial Completion.

C. As installation of other construction proceeds, inspect fireproofing and repair damaged areas and fireproofing removed due to work of other trades.

D. Repair fireproofing damaged by other work before concealing it with other construction.

E. Repair fireproofing by reapplying it using same method as original installation or using manufacturer's recommended trowel applied product.

END OF SECTION 07 81 16

SECTION 07 81 23 - INTUMESCENT FIREPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: Requirements including but not limited to:
   1. Mastic and intumescent fire resistive coatings.
   2. Accessories necessary for a complete installation.

1.3 REFERENCE STANDARDS

A. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2015 (Reapproved 2021).

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

C. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.

D. UL 263 - Standard for Fire Tests of Building Construction and Materials; Current Edition, Including All Revisions.

1.4 PERFORMANCE REQUIREMENTS

A. Assemblies: Provide fireproofing, including auxiliary materials, according to requirements of each fire resistance design and manufacturer's written instructions.

B. Fire Resistance Design: Indicated on Drawings, tested according to ASTM E119 or UL 263; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Steel members are to be considered unrestrained unless specifically noted otherwise.

C. Surface Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Flame Spread Index: 25 or less.
   2. Smoke Developed Index: 450 or less.

D. Asbestos: Provide products containing no detectable asbestos.

1.5 SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Framing plans or schedules, or both, indicating the following:
   1. Extent of fireproofing for each construction and fire-resistance rating.
   2. Applicable fire-resistance design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
   3. Minimum fireproofing thicknesses needed to achieve required fire-resistance rating of each structural component and assembly.
   4. Treatment of fireproofing after application.

C. Samples: For each exposed product and for each color and texture specified, in manufacturer's standard dimensions in size.

D. Qualification Data: For Installer and testing agency.

E. Product Certificates: For each type of fireproofing.

F. Evaluation Reports: For fireproofing, from ICC-ES.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by fireproofing manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements.

B. Source Limitations: Obtain fireproofing for each fire-resistance design from single source.

C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for materials and execution.
   1. Build mockup of each type of fireproofing and different substrate and each required finish.
   2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

D. Pre-Installation Conference: Conduct conference at Project site.
   1. Review products, design ratings, restrained and unrestrained conditions, thicknesses, and other performance requirements.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not apply fireproofing when ambient or substrate temperature is 50 degrees F or lower unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.

B. Ventilation: Ventilate building spaces during and after application of fireproofing, providing complete air exchanges according to manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fireproofing dries thoroughly.

PART 2 - PRODUCTS

2.1 MASTIC AND INTUMESCENT FIRE-RESISTIVE COATINGS

A. Interior Mastic and Intumescent Fire Resistive Coating: Factory mixed formulation consisting of intumescent base coat and topcoat (if required), and complying with indicated fire resistance design.
   1. Manufacturers: Specifications are based on products of manufacturers named as the Basis of Design. Manufacturers listed whose products meet or exceed the specifications are approved for use on the Project. Other manufacturers must have a minimum of five (5) years’ experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.
      a. Albi Manufacturing; a division of StanChem, Inc.
      b. Carboline Company; a subsidiary of RPM International.
      c. Isolatek International.
   2. Basis of Design: “CAFCO SprayFilm WB 5 System” as manufactured by Isolatek International
   3. Interior Application: Designated for "interior general purpose" "conditioned interior space purpose" use by a qualified testing agency acceptable to authorities having jurisdiction.
   4. Thickness: Required for fire-resistance design indicated, measured according to requirements of fire-resistance design.
   5. Hardness: Not less than 65 Type D durometer, according to ASTM D2240.
   6. Finish: As selected by Architect from manufacturer's standard finishes or spray-textured finish.
      a. Color and Gloss: As indicated by manufacturer's designations, match Architect's sample or as selected by Architect from manufacturer's full range.

B. Exterior Mastic and Intumescent Fire Resistive Coating: Factory mixed formulation consisting of intumescent base coat and topcoat, and complying with indicated fire resistance design.

1. Manufacturers: Specifications are based on products of manufacturers named as the Basis of Design. Manufacturers listed whose products meet or exceed the specifications are approved for use on the Project. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.
    a. Albi Manufacturing; a division of StanChem, Inc.
    b. Carboline Company; a subsidiary of RPM International.
    c. Isolatek International.
2. Basis of Design: "CAFCO SprayFilm WB 4 System" as manufactured by Isolatek International
3. Exterior Application: Designated for "exterior" use by a qualified testing agency acceptable to authorities having jurisdiction.
4. Thickness: Required for fire-resistance design indicated, measured according to requirements of fire-resistance design.
5. Hardness: Not less than 65 Type D durometer, according to ASTM D2240.
6. Finish: As selected by Architect from manufacturer's standard finishes or spray-textured finish.
    a. Color and Gloss: As indicated by manufacturer's designations, match Architect's sample or as selected by Architect from manufacturer's full range.

2.2 AUXILIARY MATERIALS

A. Provide auxiliary materials that are compatible with fireproofing and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.

B. Substrate Primers: Primers approved by fireproofing manufacturer and complying with required fire-resistance design by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

C. Reinforcing Fabric: Glass- or carbon-fiber fabric of type, weight, and form required to comply with fire-resistance designs indicated; approved and provided by fireproofing manufacturer.

D. Reinforcing Mesh: Metallic mesh reinforcement of type, weight, and form required to comply with fire-resistance design indicated; approved and provided by fireproofing manufacturer. Include pins and attachment.

E. Topcoat: Suitable for application over applied fireproofing; of type recommended in writing by fireproofing manufacturer for each fire-resistance design.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and according to each fire-resistance design.
    1. Verify that substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulate, or other foreign substances capable of impairing bond of fireproofing with substrates under conditions of normal use or fire exposure.
    2. Verify that objects penetrating fireproofing, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
    3. Verify that substrates receiving fireproofing are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fireproofing application.

B. Conduct tests according to fireproofing manufacturer's written instructions to verify that substrates are free of substances capable of interfering with bond.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Cover other work subject to damage from fallout or overspray of fireproofing materials during application.

B. Clean substrates of substances that could impair bond of fireproofing.

C. Prime substrates where included in fire-resistance design and where recommended in writing by fireproofing manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fireproofing.

D. For applications visible on completion of Project, repair substrates to remove surface imperfections that could affect uniformity of texture and thickness in finished surface of fireproofing. Remove minor projections and fill voids that would telegraph through fire-resistive products after application.

3.3 APPLICATION

A. Construct fireproofing assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, topcoats, finishing, and other materials and procedures affecting fireproofing work.

B. Comply with fireproofing manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fireproofing; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.

C. Coordinate application of fireproofing with other construction to minimize need to cut or remove fireproofing.
   1. Do not begin applying fireproofing until clips, hangers, supports, sleeves, and other items penetrating fireproofing are in place.
   2. Defer installing ducts, piping, and other items that would interfere with applying fireproofing until application of fireproofing is completed.

D. Install auxiliary materials as required, as detailed, and according to fire-resistance design and fireproofing manufacturer's written instructions for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by fireproofing manufacturer.

E. Spray apply fireproofing to maximum extent possible. After the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by fireproofing manufacturer.

F. Extend fireproofing in full thickness over entire area of each substrate to be protected.

G. Install body of fireproofing in a single course unless otherwise recommended in writing by fireproofing manufacturer.

H. Provide a uniform finish complying with description indicated for each type of fireproofing material and matching finish approved for required mockups.

I. Cure fireproofing according to fireproofing manufacturer's written instructions.

J. Do not install enclosing or concealing construction until after fireproofing has been applied, inspected, and tested and corrections have been made to deficient applications.

K. Finishes: Where indicated, apply fireproofing to produce the following finish.
   1. Manufacturer's Standard Finishes: Finish according to manufacturer's written instructions for each finish selected.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
   1. Test and inspect as required by the IBC.

B. Perform the tests and inspections of completed Work in successive stages. Do not proceed with application of fireproofing for the next area until test results for previously completed applications of fireproofing show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.

C. Fireproofing will be considered defective if it does not pass tests and inspections.
   1. Remove and replace fireproofing that does not pass tests and inspections, and retest.
   2. Apply additional fireproofing, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.

D. Prepare test and inspection reports.

3.5 CLEANING, PROTECTING, AND REPAIRING

A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

B. Protect fireproofing, according to advice of manufacturer and Installer, from damage resulting from construction operations or other causes, so fireproofing is without damage or deterioration at time of Substantial Completion.

C. As installation of other construction proceeds, inspect fireproofing and repair damaged areas and fireproofing removed due to Work of other trades.

D. Repair fireproofing damaged by other work before concealing it with other construction.

E. Repair fireproofing by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

END OF SECTION 07 81 23

SECTION 07 84 13 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Penetrations in fire-resistance-rated walls.
   2. Penetrations in horizontal assemblies.
   3. Penetrations in smoke barriers.

1.3 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a (Reapproved 2017).

C. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestop Systems; 2024.

D. FM 4991 - Approval Standard of Firestop Contractors; 2013.

E. UL 1479 - Standard for Fire Tests of Penetration Firestops; Current Edition, Including All Revisions.

1.4 ALLOWANCES

A. Penetration firestopping Work is part of an allowance.

1.5 UNIT PRICES

A. Work of this Section is affected by unit prices.

1.6 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.7 SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.
   1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.

C. Qualification Data: For Installer.

D. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.8 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.9 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Global according to GlobalFM 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

1.10 PROJECT CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.11 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

1.12 WARRANTY

A. Written warranty signed by manufacturer, installer, and Contractor in which manufacturer agree to repair or replace firestopping materials that fail in materials or workmanship within specified warranty period.

B. Warranty Period: Two (2) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:
   1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
   2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
      a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.
         1) UL in its "Fire Resistance Directory."
         2) Intertek Group in its "Directory of Listed Building Products."
         3) FM Global in its "Building Materials Approval Guide."

2.2 PENETRATION FIRESTOPPING SYSTEMS

A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
   1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg .
   1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
   2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
   3. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.

D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg .

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at and no more than 50-cfm cumulative total for any 100 sq. ft. at both ambient and elevated temperatures.

E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E84.

F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.
1. Permanent forming/damming/backing materials.
2. Substrate primers.
3. Collars.
4. Steel sleeves.

2.3 FILL MATERIALS

A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer sleeve lined with an intumescent strip, a flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.

E. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.

F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.

I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

2.4 MIXING

A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:
   1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
   2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
   3. Remove laitance and form-release agents from concrete.

B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.

B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.
   1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.

C. Install fill materials by proven techniques to produce the following results:
   1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
   2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
   3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.
   1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet

B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
   1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
   2. Contractor's name, address, and phone number.
   3. Designation of applicable testing and inspecting agency.
   4. Date of installation.
   5. Manufacturer's name.
   6. Installer's name.

3.5 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E2174.

B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.

C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

END OF SECTION 07 84 13

SECTION 07 84 43 - JOINT FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Joints in or between fire-resistance-rated constructions.
   2. Joints at exterior curtain-wall/floor intersections.
   3. Joints in smoke barriers.

1.3 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

B. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems; 2015 (Reapproved 2019).

C. ASTM E2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-Story Test Apparatus; 2025.

D. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers; 2024.

E. FM 4991 - Approval Standard of Firestop Contractors; 2013.

F. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.
   1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency's illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

C. Qualification Data: For Installer.

D. Product Test Reports: For each joint firestopping system, for tests performed by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 'sFM 4991, "Standard for the Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install joint firestopping systems when ambient or substrate temperatures are outside limits permitted by joint firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Install and cure joint firestopping systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.9 COORDINATION

A. Coordinate construction of joints to ensure that joint firestopping systems can be installed according to specified firestopping system design.

B. Coordinate sizing of joints to accommodate joint firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:
   1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
   2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:
      a. Joint firestopping systems shall bear classification marking of a qualified testing agency.
         1) UL in its "Fire Resistance Directory."
         2) Intertek Group in its "Directory of Listed Building Products."

2.2 JOINT FIRESTOPPING SYSTEMS

A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E1966 or UL 2079.
   1. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.

C. Joints at Exterior Curtain-Wall/Floor Intersections: Provide joint firestopping systems with rating determined per ASTM E2307.
   1. F-Rating: Equal to or exceeding the fire-resistance rating of the floor assembly.

D. Joints in Smoke Barriers: Provide fire-resistive joint systems with ratings determined per UL 2079 based on testing at a positive pressure differential of 0.30-inch wg (74.7 Pa).
   1. L-Rating: Not exceeding 5.0 cfm/ft. (0.00775 cu. m/s x m) of joint at both ambient and elevated temperatures.

E. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E84.

F. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Before installing fire-resistive joint systems, clean joints immediately to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
   1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of elastomeric fill materials or compromise fire-resistive rating.
   2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with elastomeric fill materials. Remove loose particles remaining from cleaning operation.
   3. Remove laitance and form-release agents from concrete.

B. Prime substrates where recommended in writing by joint firestopping system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

A. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
   1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.

C. Install elastomeric fill materials for fire-resistive joint systems by proven techniques to produce the following results:
   1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
   2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
   3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
   1. The words "Warning - Joint Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
   2. Contractor's name, address, and phone number.
   3. Designation of applicable testing agency.
   4. Date of installation.
   5. Manufacturer's name.
   6. Installer's name.

3.5 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E2393.

B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.

C. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

A. Clean off excess elastomeric fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by joint firestopping system manufacturers and that do not damage materials in which joints occur.

B. Provide final protection and maintain conditions during and after installation that ensure joint firestopping systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

END OF SECTION 07 84 43

SECTION 07 92 00 - JOINT SEALANTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: Requirements including but not limited to:
   1. Control and expansion joints on exposed surfaces.
   2. Perimeter joints between wall surfaces and frames of doors and openings.
   3. Joints between plumbing fixtures and adjoining walls, floors, and counters.
   4. Joints indicated or as necessary.
   5. Accessories necessary for a complete installation.

1.3 REFERENCE STANDARDS

A. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants; 2018 (Reapproved 2022).

B. ASTM C834 - Standard Specification for Latex Sealants; 2017.

C. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2018.

D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

E. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008 (Reapproved 2023).

F. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).

G. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2018.

H. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2018.

I. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints; 2019 (Reapproved 2020).

J. ASTM D1752 - Standard Specification for Preformed Sponge Rubber, Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction; 2018.

K. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).

L. ASTM E2129 - Standard Practice for Data Collection for Sustainability Assessment of Building Products; Current.

1.4 SUBMITTALS

A. Product Data: Technical data for each joint sealant product. Submit written certification from manufacturers of sealants attesting products are suitable for use indicated, verified through in house testing laboratory.
   1. Written certification from manufacturers of joint sealants attesting that products comply with specification requirements and suitable for use indicated verified through manufacturers testing laboratory within the past 36 months or since most recent reformulation, whichever is most recent.
      a. Complete instructions for handling, storage, mixing, priming, installation, curing and protection of each type of sealant.
      b. Manufacturer's letter, clearly indicating proposed lot numbers of each sealant supplied and expiration date sequence.
      c. Instructions for handling, storage, mixing, priming, installation, curing, and protection of each type of sealant.

2. VOC Data: Submit manufacturer’s product data for sealants. Indicate VOC limits of the product. Submit MSDS highlighting VOC limits.
3. Submit environmental data in accordance with Table 1 of ASTM E2129 for products provided under work of this Section.

B. Certificates and Reports:
1. Product Certificates: Manufacturer's product certificate for each kind of joint sealant and accessory.
2. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.
3. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
4. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
a. Materials forming joint substrates and sealant backings have been tested for compatibility and adhesion with sealants.
b. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
5. Preconstruction Field Adhesion Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified.
6. Exterior Product Approvals:
a. Manufacturer shall certify that product complies with and has been tested and approved in compliance with Florida Product Approval or Miami Dade NOA and applicable requirements.
b. Manufacturer shall certify that product complies with large [and small] missile impact criteria and has been tested and approved in compliance with Florida Product Approval or Miami Dade NOA and applicable requirements.
7. Field Adhesion Test Reports: For each sealant application tested.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Firm having minimum 5 years documented experience and specializing in the installation of sealants.
1. Exposed sealant work (sealants used for air and weatherseals external to curtain wall systems at perimeter, metal panel to panel joints) shall be performed by a single (i.e. one) firm specializing in the installation of sealants who has successfully produced work comparable to project.
2. Concealed sealant work (sealants which are internal to metal framed curtain wall systems, skylights, and providing an air seal) shall be the responsibility of the subcontractor providing erection of the respective system.

B. Source Limitations: Obtain each type of joint sealant from a single manufacturer.

C. Product Testing: Test joint sealants using a qualified testing agency.
1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.
2. Test according to SWRI Sealant Validation Program for compliance with requirements specified by reference to ASTM C920 for adhesion and cohesion under cyclic movement, adhesion in peel, and indentation hardness.

D. Environmental Requirements:
1. Toxicity/IEQ: Comply with applicable regulations regarding toxic and hazardous materials.
a. VOC Content of Interior Sealants: Refer to Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions for VOC limits of sealants installed within the building.
b. Sealants containing aromatic solvents, fibrous talc, formaldehyde, halogenated solvents, mercury, lead, cadmium, chromium and their compounds, are not permitted.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials in compliance with manufacturer written instructions to prevent deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:
   1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40 degrees F.
   2. When joint substrates are wet. Should joints or backing materials become wet, remove and replace backing material with new.

B. Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.8 WARRANTY

A. Installer's Warranty: Written warranty, signed by Installer agreeing to repair or replace elastomeric joint sealant work which has failed to provide a weathertight system within specified warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.

B. Warranties: Written warranties (weatherseal and stain resistance), signed by sealant manufacturer agreeing to furnish joint sealants to repair or replace those that fail to provide airtight and watertight joints, or fail in adhesion, cohesion, abrasion resistance, stain resistance, weather resistance, durability, or appear to deteriorate in manner not specified in the manufacturer's data as an inherent quality of the material within specified warranty period.
   1. Warranty Period: 5 years from date of Substantial Completion, 20 years for silicone sealants.

C. Warranties specified exclude deterioration or failure of sealants from:
   1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
   2. Disintegration of joint substrates from natural causes exceeding design specifications.
   3. Mechanical damage caused by individuals, tools, or outside agents.
   4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Compatibility: Provide joint sealants, backings, and related materials compatible with one another and with joint substrates, air barrier system, and masonry under conditions of service and application, as stated by sealant manufacturer’s published data, and as substantiated by the manufacturer for each application through testing.

B. Liquid Applied Sealants: Comply with ASTM C920 and requirements indicated for each liquid applied sealant specified, including those referencing ASTM C920 classifications for type, grade, class, and uses related to exposure and joint substrates.

C. Stain Test Response Characteristics: For sealants in contact with porous substrates, provide non-staining products that have undergone testing according to ASTM C1248 and do not stain porous joint substrates.

D. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

E. Colors: For fully concealed joints, provide standard color of sealant that has the best overall performance characteristics for the application shown. For exposed joints, match adjacent surface. For exposed joints, submit color samples to architect for approval, from manufacture's full line of standard colors.

F. Manufacturer's Representative: Use sealant produced by manufacturer who agrees to send a qualified technical representative to site upon request for the purpose of rendering advice concerning the recommended installation of manufacturer's materials.

G. Sealants: Self leveling compounds for horizontal joints in pavements and non-sag compounds elsewhere except as shown or specified.

H. Silicone Sealant: ASTM C920, Type M, Grade NS, Class 25; use NT, M, A and O.
   1. Use: Precast Concrete Joints between metals, glass, and plastics (Two part silicone sealants).
   2. Properties: Performance: Non-staining, non-bleeding, and non-streaking to sealed and adjacent substrates. The minimum pli value after 7 day immersion shall not be less than 13 when tested in strict accordance with ASTM C794 Adhesion and Peel.
   3. Cure System and Oil Content: Neutral Cure System specifically manufactured with controlled oil content to eliminate oil migration into sealed substrates and residue rundown over and onto adjacent substrates.
   4. Product and Manufacturer: Dow Corning; 756 Silicone Building Sealant - HP with Additive.

I. Silicone Sealant: ASTM C920, Type S, Grade NS, Class 50, use NT.
   1. Use: Precast Concrete Joints between metals, glass, and plastics (Single component sealants).
   2. Properties: Performance: Non-staining, non-bleeding, and non-streaking to sealed and adjacent substrates.
   3. Cure System and Oil Content: Neutral Cure System specifically manufactured with controlled oil content to eliminate oil migration into sealed substrates and residue rundown over and onto adjacent substrates.
   4. Product and Manufacturer:
      a. BASF Building Systems; Omniseal 50.
      b. Dow Corning Corporation; 756 SMS, 791, 795, 995 as applicable.
      c. GE Advanced Materials, Silicones; SilGlaze II SCS2800, SilPruf NB SCS9000, SilPruf SCS2000, or UltraPruf II SCS2900 as applicable.
      d. Sika Corporation, Construction Products Division; SikaSil-C995.

J. Polyurethane Sealants: ASTM C920, Type M, Grade NS, Class 25; use NT, M, A and O.
   1. Use: Typical Wall and Floor Joints (Two part polyurethane sealants).
   2. Properties: Performance: Non-staining, non-bleeding, non-streaking to sealed and adjacent substrates.
   3. Products and Manufacturers:
      a. BASF Building Systems; Sonolastic NP-2.
      b. Pecora Corporation; Dynatred.
      c. Sika Corporation, Construction Products Division; Sikaflex 2c NS or Sikaflex 2c NS TG as applicable.

K. Two Part Polyurethane Sealants: ASTM C920, Type M, Grade NS, Class 50; use NT, M, A and O.
   1. Use: Typical Wall and Floor Joints (Two Part Polyurethane Sealants).

2. Properties: Performance: Non-staining, non-bleeding, and non-streaking to sealed and adjacent substrates. The minimum pli value after 7 day immersion shall not be less than 13 when tested in strict accordance with ASTM C794 Adhesion in Peel.
3. Products and Manufacturers: One of the following:
    a. Schnee-Morehead, Inc.; Permathane SM 7200.
    b. Sika Corporation, Inc.; Sikaflex - 2c NS TG.
    c. BASF Construction Chemicals; NP 2.

L. Mildew Resistant Silicone Sealant: ASTM C920, Type S, Grade NS, Class 25, Use NT, Substrate uses G, A, and O; and containing fungicide for mildew resistance; acid curing.
1. Use: Joints at toilet fixtures, toilet room countertops and vanities, wet areas, and janitor closet mop receptor to wall transition.
2. Products: Provide one of the following:
    a. BASF Building Systems; Omniplus.
    b. Dow Corning; 786 Mildew Resistant Silicone Sealant.
    c. GE Silicones; Sanitary SCS 1700.

M. Latex Sealant: Non-elastomeric, one part, non-sag, paintable latex sealant that is recommended for exposed applications on the interior. Complying with ASTM C834, Type OP (opaque sealants):
1. Products: Subject to compliance with requirements, provide one of the following:
    a. Pecora Corporation; AC-20 + Silicone.
    b. BASF; Sonolastic Sonolac.

N. Acoustical Joint Sealant: Non-sag, paintable, non-staining latex sealant complying with ASTM C834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90.
1. Products: Subject to compliance with requirements, provide one of the following:
    a. Hilti, Inc.
    b. Pecora Corporation; AC-20 FTR or AIS-919.
    c. Specified Technologies, Inc.
    d. USG Corporation; SHEETROCK Acoustical Sealant.

O. Sealant Backing: Provide sealant backings that are non-staining; compatible with joint substrates, sealants, primers, and joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
1. Cylindrical Sealant Backings: Preformed, compressible, resilient, non-staining, non-waxing, non-extruding backings of flexible plastic foam complying with ASTM C1330, and of type indicated below. Select shape and density of cylindrical sealant backings in consultation with the manufacturer for proper performance in specific condition of use in each case.
2. Type C: Closed cell polyethylene foam material with surface skin, nonabsorbent to liquid water and gas, non-outgassing in unruptured state; one of the following:
    a. HBR Closed Cell Backer Rod; Nomaco, Inc.
    b. Sonolastic Closed-Cell Backer-Rod; BASF Construction Chemicals.

P. Butyl Mastic Tape: High-tack, self-fusing butyl rubber mastic.
1. Compatible with air barrier system.
2. Locations: At masonry veneer anchors and where indicated on Drawings.
3. Products: “Butyl Mastic Tape 2212” as manufactured by 3M or architect approved equal.

Q. Miscellaneous Materials:
1. Primer: Material recommended, as verified through compatibility and adhesion testing, by joint sealant manufacturer for the substrates indicated to be sealed.
2. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.

3. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and which will not stain nor mar the finish of surface adjacent to joints to which it is applied.
4. Cork Joint Filler: Resilient and non-extruding ASTM D1752, Type II.
5. Bond Breaker Tape: Polyethylene, TFE fluorocarbon, or plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants for compliance with requirements for joint configuration, installation tolerances, and conditions affecting sealant performance. Proceed with installation after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with the recommendations of joint sealant manufacturer and requirements:
   1. Remove foreign material from joint substrates interfering with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), existing joint sealants, oil, grease, water, surface dirt, and frost.
   2. Clean concrete, masonry, unglazed surfaces of tile and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil free compressed air.
   3. Remove laitance and form-release agents from concrete.
   4. Clean metal, glass, porcelain enamel, glazed surfaces of tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

B. Joint Priming: Prime joint substrates where recommended in writing by joint sealant manufacturer, based on prior testing and experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION

A. Silicone Glazing Sealants: Refer to Section 08 80 00 - Glazing.

B. Comply with joint sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

C. Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants applicable to materials, applications, and conditions indicated.

D. Sealant Backings: Install sealant backings to support sealants during application and at position necessary to produce cross sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
   1. Do not leave gaps between ends of sealant backings. Trim for tight fit around obstructions or elements penetrating the joint.
   2. Do not stretch, twist, puncture, or tear sealant backings.
   3. Remove absorbent sealant backings that become wet before sealant application and replace with dry sealant backings.

4. Install bond breaker tape behind sealants where backings are not used between sealants and back of joints.

E. Weeps and Vents: Install weeps and vents into joints at the same time sealants are being installed. Locate weeps and vents spaced recommended by sealant manufacturer and the window and curtain wall fabricator and erector. Do not install weeps and vents at outside building corners. Do not install vents at horizontal joints immediately below shelf angles, sills, and through wall flashings.

F. Sealants: Install sealants by proven techniques resulting in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at same time sealant backings are installed.
   1. Apply sealants in depth in accordance with manufacturer's recommendations and recommended general proportions and limitations.
   2. Apply elastomeric sealants, in joints not subject to traffic or abrasion, to a depth equal to 50% of the joint width, but not less than 1/4 inch and not more than 1/2 inch .
   3. Apply non-elastomeric sealants to a depth approximately equal to the joint width.

G. Tooling of Non-sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform, beads to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces. Tool exposed surfaces of sealants to the profile shown, or if none is shown, tool slightly concave.
   1. Use masking tape to protect adjacent surfaces of recessed tooled joints.
   2. Provide a slight wash on horizontal joints where horizontal and vertical surfaces meet.
   3. Against rough surfaces or in joints of uneven widths avoid the appearance of excess sealant or compound by locating the compound or sealant well back into joint wherever possible.

H. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping. Do not pull or stretch material. Produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures, apply heat to sealant in compliance with sealant manufacturer's written instructions.

I. Acoustical Sealant Installation: At sound rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer written recommendations.

3.4 FIELD QUALITY CONTROL

A. Field Adhesion Testing: Field test exterior wall joint sealant adhesion to joint substrates:
   1. Extent of Testing: Test completed and cured sealant joints:
      a. Perform 10 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
      b. Perform 1 test for each 1000 feet of joint length thereafter or 1 test per each floor per elevation.
   2. Test Method: Test joint sealants according to Method A, Field Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
   3. Inspect tested joints and report on the following:
      a. Whether sealants filled joint cavities and are free of voids.
      b. Whether sealant dimensions and configurations comply with specified requirements.
      c. Whether sealants in joints connected to pulled out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer field adhesion hand pull test criteria.

4. Record test results in a field adhesion test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure original sealant surfaces are clean and new sealant contacts original sealant.

B. Evaluation of Field Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 SITE ENVIRONMENTAL PROCEDURES

A. Indoor Air Quality: Provide temporary ventilation during work. Coordinate interior application of sealants with interior finishes schedule.

3.6 CLEANING AND PROTECTION

A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

B. Protect joint sealants during and after curing from contact with contaminating substances and from damage so sealants are without deterioration or damage at time of Substantial Completion. If, despite protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from the original work.

END OF SECTION 07 92 00

SECTION 07 95 13 - EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Expansion joint cover assemblies for floor, wall, ceiling, and soffit surfaces.

1.3 REFERENCE STANDARDS

A. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

B. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

C. ASTM B308/B308M - Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles; 2020.

D. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems; 2015 (Reapproved 2019).

E. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Installation Templates: For frames and anchors to be embedded in concrete or masonry, furnish templates to relevant installers; include installation instructions and tolerances.

1.5 SUBMITTALS

A. Refer to Section 01 33 00 - Submittal Procedures for submittal procedures.

B. Product Data: Provide joint assembly profiles, profile dimensions, anchorage devices and available colors and finish.

C. Shop Drawings: Indicate joint and splice locations, miters, layout of the work, affected adjacent construction and anchorage locations.

D. Samples: Submit two samples 6 inches long, illustrating profile, dimension, color, and finish selected.

E. Manufacturer's Installation Instructions: Indicate rough-in sizes and required tolerances for item placement.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
   1. Architectural Art Mfg, Inc: www.archart.com.
   2. Balco, Inc.: www.balcousa.com.
   3. Construction Specialties, Inc: www.c-sgroup.com.
   4. EMSEAL Joint Systems, Ltd: www.emseal.com.
   5. Inpro: www.inprocorp.com.
   6. MM Systems Corp: www.mmsystemscorp.com.
   7. Nystrom, Inc: www.nystrom.com.
   8. Pecora Corporation: www.pecora.com.
   9. SITURA Inc: www.situra.com.

10. Watson Bowman Acme Corporation: www.watsonbowmanacme.com.

B. Substitutions: Refer to Section - 01 25 00 - Substitution Procedures.
   1. Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution.

2.2 EXPANSION JOINT COVER ASSEMBLY APPLICATIONS

A. Interior Floor Joints Subject to Thermal Movement (EJC-1):
   1. Basis of Design Manufacturer(s) and Product(s):
      a. Balco, Inc; No-Bump Floor to Floor System, Aluminum (NBAF).
      b. Construction Specialties, Inc; Allway Standard Metal Floor Covers.
      c. Watson Bowman Acme Corporation; Wabo CorridorWrap Floor.

B. Interior Wall/Ceiling Joints Subject to Thermal Movement (EJC-3):
   1. Basis of Design Manufacturer(s) and Product(s):
      a. Balco, Inc; Wall and Ceiling Snap-On Joint Cover (WD).
      b. Construction Specialties, Inc; Allway Standard Wall and Ceiling Covers.

C. Interior Fire-Rated Floor/Wall/Ceiling Joints Subject to Thermal Movement (EJC-7):
   1. Basis of Design Manufacturer(s) and Product(s):
      a. Construction Specialties, Inc; Fire Barriers.

D. Interior/Exterior Fire-Rated Wall Joints Subject to Thermal Movement (EJC-8):
   1. Basis of Design Manufacturer(s) and Product(s):
      a. EMSEAL Joint Systems, Ltd; Emshield WFR2 System.

E. Exterior Wall Joints Subject to Thermal Movement (EJC-9):
   1. Basis of Design Manufacturer(s) and Product(s):
      a. Balco, Inc; Exterior Wall, Elastomeric Face Seal System (FCWW).
      b. Construction Specialties, Inc; Exterior Wall Covers.
      c. EMSEAL Joint Systems, Ltd; BG System.
      d. SITURA Inc; RedLINE Waterproof Expansion Joint Systems.

F. Exterior Roof Expansion Joint Covers (EJC-12):
   1. Basis of Design Manufacturer(s) and Product(s):
      a. Balco, Inc; Roof Metal Plate System, with Canted Curb (LPR).
      b. SITURA Inc; RedLINE Waterproof Expansion Joint Systems.

2.3 EXPANSION JOINT COVER ASSEMBLIES

A. Expansion Joint Cover Assemblies - General: Factory-fabricated and assembled; designed to completely fill joint openings, sealed to prevent passage of air, dust, water, smoke; suitable for traffic expected.
   1. Joint Dimensions and Configurations: As indicated on drawings.
   2. Joint Cover Sizes: Selected to suit joint width and configuration, based on manufacturer's published recommendations and limitations.
   3. Joint Movement Capability: If not indicated, provide minimum plus/minus 25 percent joint movement capability.
   4. Lengths: Provide covers in full lengths required; avoid splicing wherever possible.
   5. Anchors, Fasteners, and Fittings: Provided by cover manufacturer.

B. Floor Joint Covers: Coordinate with indicated floor coverings.
   1. If floor covering is not indicated, obtain instructions from Architect before proceeding.
   2. If style is not indicated, provide extruded aluminum frame both sides, resilient seals, and minimize exposed metal.

C. Covers in Gypsum Board Assemblies: Provide style with anchoring wings that can be completely covered by joint compound.

D. Covers in Fire Rated Assemblies: Provide cover assembly having fire rating equivalent to that of assembly into which it is installed.

2.4 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper; or ASTM B308/B308M, 6061 alloy, T6 temper.

B. Resilient Seals:
   1. For Ceilings: Any resilient material, flush, pleated, or hollow gasket.
   2. For Pedestrian Traffic Applications: EPDM rubber, Neoprene, or Santoprene; no PVC; Shore A hardness of 40 to 50 Durometer.
   3. Color: Gray.

C. Anchors and Fasteners: As recommended by cover manufacturer.

D. Ferrous Metal Anchors: Galvanized where embedded in concrete or in contact with cementitious materials.

E. Threaded Fasteners: Aluminum.

F. Backing Paint for Aluminum Components in Contact with Cementitious Materials: Asphaltic type.

2.5 ACCESSORIES

A. Resilient Fire Barrier: For use with metal expansion joint covers and elastomeric seals without use of mechanical fasteners, with fire rating in accordance with surrounding construction performance capabilities.
   1. Application: Floor.
   2. Fire Resistance Rating: 2-hour, in accordance with ASTM E1966 and UL 2079.
   3. Manufacturer(s) and product(s):
      a. Balco, Inc; Expansion Joint Fire Barrier, Floor/Roof - MetaBlock, 2 Hour (MBF2H).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that joint preparation and dimensions are acceptable and in accordance with manufacturer's requirements.

B. Verify that frames and anchors installed by others are in correct locations and suitable for installation of remainder of assembly.

3.2 INSTALLATION

A. Install components and accessories in accordance with manufacturer's instructions.

B. Install expansion joints in accordance with TCA publication EJ171.

C. Align work plumb and level, flush with adjacent surfaces.

D. Rigidly anchor to substrate to prevent misalignment.

3.3 PROTECTION

A. Do not permit traffic over unprotected floor joint surfaces.

B. Provide strippable coating to protect finish surface.

END OF SECTION 07 95 13

SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Provide items shown on the Drawings and specified, including, but not limited to the following:
   1. Standard steel doors for interior or exterior use.
   2. Acoustically-insulated steel doors for interior use.
   3. Opening protective steel doors for interior or exterior use.
   4. Thermally-insulated doors for interior or exterior use.
   5. Steel frames for doors, sidelites, transoms, and windows.

B. Related Sections:
   1. Section 05 40 00 - Cold Formed Metal Framing.
   2. Section 07 92 00 - Joint Sealants.
   3. Section 08 80 00 - Glazing.
   4. Section 09 21 16 - Gypsum Board Assemblies.
   5. Section 09 90 00 - Painting and Coating.

1.3 REFERENCE STANDARDS

A. ANSI A250.13 - Testing and Rating of Severe Windstorm Resistant Components for Swinging Door Assemblies for Protection of Building Envelopes; 2018.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

C. ASTM A924/A924M - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process; 2022a.

D. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.

E. ASTM C1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus; 2019.

F. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.

G. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).

H. ASTM E413 - Classification for Rating Sound Insulation; 2022.

I. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.

J. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.

K. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

1.4 SUBMITTALS

A. Product Data:
   1. Manufacturer's standard details and catalog data demonstrating compliance with specifications and referenced standards.
   2. Manufacturer's installation instructions.

B. Shop Drawings:

1. Indicate complete schedule in detail for each steel door and frame using the same reference number for details and openings as those on the contract Drawings. If any door is not by the steel door manufacturer, only the door opening number should be shown along with the type of door (wood, plastic laminate faced, etc.):
    a. Show details of construction, installation, connections, anchors, hardware reinforcement, hardware preparation, louvers, and floor and threshold clearances.

C. Samples are required from non-Steel Door Institute members:
1. 12 inch by 12 inch sample of a fire-rated and non-rated door, cut from corner of door, showing door construction.
2. 12 inch by 12 inch sample of each type of door louver specified or required, showing louver construction.
3. 6 inch long sample of a fire-rated, non-rated frame, and each type of glass stop specified or required, showing corner and construction.

D. Certificates: Manufacturer's certification that oversized openings are in compliance with specifications.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A company specializing in the manufacturer of steel doors and frames of the type specified for this Project with a minimum of 5 years' experience.

B. All steel doors and frames shall be by a single manufacturer, shop drawings to be submitted with manufacturer's insignia, which is being supplied.

C. Furnish steel doors and frames to meet current ANSI/Steel Door Standards.

D. Windstorm Resistance: Comply with ANSI A250.13.

E. Structural Performance: Comply with ASTM E330/E330M.

F. Air Leakage: Comply with ASTM E283/E283M.

G. Regulatory Requirements:
1. Fire-Rated Assemblies:
    a. Opening protective door, panel, frame, and fire window construction shall conform to NFPA 252, or UL 10B, as applicable, and acceptable to the code of authorities having jurisdiction.
    b. Opening Protective Door Construction:
        1) Notwithstanding any other requirements of this Section, provide gauge of metal, method of construction, hardware preparation, reinforcement, and placement, glass opening size, and other specifics required to obtain the specified or required label. The label shall contain the fire resistance rating (20 minute, 45 minute, 1 hour, 1-1/2 hour, 3 hour, etc.) and the designation (A, B, C, D, or E); doors with B Label being 1-1/2 hour.
        2) Fire-rated doors used in a stairway enclosure, shall be so constructed so that the maximum transmitted temperature shall not exceed 450 degrees F above ambient temperature at the end of 30 minutes of the Standard Fire Exposure Test and shall be so noted on the label.
    c. Opening Protectives Hollow Metal Doors:
        1) Conform to NFPA 80 for fire-rated class shown or required by code of authorities having jurisdiction:
            (a) Units shall be identical to assemblies whose fire resistance characteristics have been determined in accordance with requirements specified above, and shall be labeled and listed by UL, WHI, or other inspection and testing agency acceptable to the code of authorities having jurisdiction.
            (b) Fire-rated steel doors, panels, frames, and fire windows shall bear permanent labels attesting to fire resistance. At stairway enclosures, provide units listed for 450 degree F maximum temperature rise rating for 30 minutes of exposure.

(c) Oversized openings shall be constructed in accordance with all applicable requirements for labeled door construction.
(d) Fire rated door assemblies with gaps in excess of 1/8 inch between door and frame will not comply with NFPA 80.
(e) Locate label on hinge side of doors and frames so that when door is closed, label is not visible.
(f) Caution shall be taken to ensure that labels are not removed, damaged, or painted over.
(g) Glass panes shall not exceed sizes allowed whether indicated or not on the Drawings.

2. Wind Loads:
   a. Provide hollow metal and door hardware assemblies approved by Authorities Having Jurisdiction (AHJ), including anchorage, capable of withstanding wind load design pressures calculated for this Project by a registered Architect or Engineer and are part of the construction documents.
3. Accessibility Requirements:
   a. Comply with applicable requirements:
      1) Americans with Disability Act of 1990, as amended: 2010 ADA Standards.

H. Pre-Installation Conference: Refer to Section 01 31 00 - Project Management and Coordination.

1.6 WARRANTY

A. Warrant the work specified herein for one year against becoming unserviceable or causing an objectionable appearance resulting from either defective or non-conforming materials and workmanship.

B. Defects shall include, but not be limited to:
1. Use of incorrect materials in opening.
2. Incorrect labeled components installed within opening.
3. Noisy, rough, or difficult operation.
4. Failure to meet specified quality assurance requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in accordance with manufacturer’s instructions, and as follows:
1. In manufacturer's original, clearly labeled, undamaged containers or wrappers.
2. Containers or wrappers shall list the name of the manufacturer and product.

B. Deliver materials to allow for minimum storage time at the Project site. Coordinate delivery with the scheduled time of installation.

C. Protect products from moisture, construction traffic, and damage:
1. Store under cover in a clean, dry place, protected from weather and abuse.
2. Store in a manner that will prevent rust or damage.
3. Store doors in a vertical position, spaced with blocking to permit air circulation.
4. Do not use non-vented plastic or canvas shelters.
5. Should containers or wrappers become wet, remove immediately.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
1. Ceco Door, an ASSA ABLOY company: www.cecodoor.com
2. CURRIES, an ASSA ABLOY company: www.curries.com
3. Pioneer Industries, Inc., an ASSA ABLOY company: www.pioneerindustries.com
4. Republic Builders Products Company: www.republicdoor.com
5. Steelcraft Mfg. Co., an Allegion company: www.steelcraft.com

B. Substitutions: Refer to Section - 01 25 00 - Substitution Procedures.
   1. Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution

2.2 MATERIALS, GENERAL

A. Exterior frames and interior frames where shown on Drawings or required in damp, moist, humid, and wet areas, i.e., toilets, locker rooms, showers, etc., to be manufactured of commercial quality, stretcher leveled flatness, cold rolled steel and galvannealed to A-60 minimum coating weight standard per ASTM A653/A653M and ASTM A924/A924M, with coating weight of not less than 0.60 ounce per square foot (0.30 ounce per square foot per side).

2.3 FRAME FABRICATION

A. Minimum Gauges:
   1. Interior:
      a. Openings less than 4 feet wide: 16 gauge.
      b. Openings 4 feet in width and greater: 14 gauge.
   2. Exterior: 14 gauge.

B. Design and Construction:
   1. Frames shall be custom made, welded units with integral trim of sizes and shapes shown on approved shop drawings. Hinge jambs that butt adjacent 90-degree walls shall have at least 4 inch wide frame face to assure the door trim will not strike the wall prior to the door opening at least 90 degrees. Frame profile shall match wall thickness where practical, i.e., 4-3/4 inch at 4 inch CMU, 6-3/4 inch at 6 inch CMU, and 8-3/4 inch at 8 inch CMU. At masonry wall openings, fabricate frames to suite masonry opening with 2 inch head member.
   2. Frames shall be strong and rigid, neat in appearance, square, true, and free of defects, warp, and buckle. Molded members shall be clean cut, straight, and of uniform profile throughout their length.
   3. Jamb depths, trim, profile, and backbends shall be as shown on approved shop drawings.
   4. Corner joints, including face and inside corners, shall have contact edges closed tight, with trim faces mitered and continuously welded, and stops butted. The use of gussets shall not be permitted. Face of frame shall be ground smooth. Knockdown (KD) frames are not permitted.
   5. Minimum depth of stops shall be 5/8 inch, except at fire windows where minimum depth of stops shall be 3/4 inch.
   6. Frames for multiple openings shall have mullion and rail members that are closed tubular shapes having no visible seams or joints. Joints between faces of abutting members shall be securely welded and finished smooth. Mullions shall be key locked removable type. Keys shall be master keyed to Owner's key system.
   7. High-Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48 inch and wider with mortise/butt type hinges only at top hinge location to deter against hinge reinforcement sag.
   8. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap for continuous hinges.
   9. Provide countersunk flat or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops; provide security head screws at exterior locations.
   10. Provide A60 galvannealed coating at frames in the following locations:
      a. Restrooms.
      b. Kitchens / kitchen suites.
      c. Locker rooms.
      d. Rooms with showers.
   11. Electrical Knock Out Boxes:

a. Factory weld 18 gauge electrical knock out boxes to frame for electrical hardware preps; included but not limited to electric thru wire hinges, electrical raceways, door position switches, electric strikes, jamb mount card readers, and magnetic licks:
    1) Electrical knock out boxes are required at door position switches, electric strikes, card readers, and middle hinge locations.
    2) Provide electrical knock out boxes with 3/4 inch knockouts.
    3) Conduit to be coordinated and installed in field from middle hinge box and strike box to door position box.
    4) Electrical knock out boxes to comply with NFPA requirements and fit electrical door hardware.
    5) Electrical knock out boxes for continuous hinges should be located in the center of the vertical dimension on the hinge jamb.
    6) Provide field installed conduit per Division 28 - Electronic Safety & Security Section for standardized plug connectors to accommodate up to 12 wires as required for electrified door hardware . Provide sufficient number of concealed wires to accommodate electric function of specified hardware. Wire nut connections are not acceptable.

12. Hardware reinforcements:
    a. Frames shall be mortised, reinforced, drilled, and tapped at factory for fully template mortised hardware . Where surface-mounted hardware is to be applied, frames shall have reinforcing plates only.
    b. Minimum thickness of hardware reinforcing plates shall be as follows:
        1) Hinge and pivot reinforcements (1-1/4-inch x 10-inch minimum size): 7 gauge.
        2) Strike Reinforcements: 12 gauge stiffeners.
        3) Flush Bolt Reinforcements: 12 gauge.
        4) Closer Reinforcements: 12 gauge.
        5) Reinforcements for surface-mounted hardware, hold-open arms, and surface panic devices: 12 gauge.
13. Floor Anchors: Minimum 14 gauge, securely welded inside each jamb, with holes for floor anchorage.
14. Jamb Anchors:
    a. Frames for installation in masonry walls shall be provided with adjustable jamb anchors of the T-strap type. Anchors shall be not less than 16 gauge steel. The number of anchors provided at each jamb shall be as follows:
        1) Frames up to 7 feet 6 inches in height: Three (3) anchors.
        2) Frames 7 feet 6 inches to 8 feet in height: Four anchors.
        3) Frames over 8 feet in height: One anchor for each 2 feet or fraction thereof in height.
    b. Frames for installation in wood or metal stud partitions shall be provided with steel anchors of suitable approved design, not less than 16-gauge thickness, securely welded inside each jamb as follows:
        1) Frames up to 7 feet 6 inches (7’-6”) in height: Four anchors.
        2) Frames 7 feet 6 inches to 8 feet in height: Five anchors.
        3) Frames over 8 feet in height: Four anchors plus one additional for each 2 feet or fraction thereof over 8 feet.
    c. Frames to be anchored to previously placed concrete, masonry, or structural steel shall be provided with anchors of suitable design as shown on approved shop drawings.
15. Dust Cover Boxes: Shall be of not less than 26 gauge steel and shall be provided at all mortised hardware items. 8 inch CMU walls with face brick shall have dual offset jamb anchors.
16. Steel Spreader: Shall be provided on all frames, temporarily attached to bottoms of both jambs for bracing during shipping and handling.

17. Loose glazing stops: Shall be of cold rolled steel, not less than 20 gauge, butted at corner joints and secured to the frame with countersunk cadmium or zinc-plated screws. Loose stops at exterior frames shall be placed on the interior side of the frames.
18. At sound rated door openings and at masonry openings, coat inside of frame profile with corrosion resistant coating to minimum thickness of 1/16 inch.

C. Frame Color: Field paint under Section 09 90 00 - Painting and Coating, color as indicated on Drawings.

2.4 DOOR FABRICATION

A. Minimum Gauges:
1. Doors: 0.047 inch or 18 gauge (16 gauge for high frequency doors).
2. 16 gauge (14 gauge for windstorm rated doors).

B. Design and Construction:
1. Thickness shall be 1-3/4 inch, unless specifically noted or shown otherwise.
2. Exterior doors: Provide doors with 22 gauge steel z-channels placed at 6 inches apart with foamed in place polyurethane core, with a thermal insulation calculated R factor of 11.01 per ASTM C518 Standards.
3. Fabrication:
   a. Doors shall be strong, rigid, and neat in appearance, free from warpage and buckle.
   b. Corner bends shall be true, straight, and of minimum radius for gage of metal used.
   c. Provide stiffeners with polystyrene core spaced maximum 6 inches on center and extending full height of door.
   d. Fill interior with noncombustible fiberglass insulation. Use rock mineral wool board filler as required for labeled doors.
   e. Faces shall be joined at vertical edges of door by a continuous weld extending full height of door. Welds shall be ground, filled, and dressed smooth to provide a smooth flush surface.
   f. Top and bottom edges of doors shall be closed with a continuous recessed steel channel not less than 16 gauge, extending full width of door and spot weld to both faces. Exterior doors shall have an additional flush closing channel at top and bottom edges. Openings shall be provided in the bottom closure channel at top and bottom edges. Openings shall be provided in the bottom closure of exterior doors to permit the escape of entrapped moisture.
   g. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap for continuous hinges.
   h. Electrical Raceways: Provide raceways for standardized plug connectors to accommodate up to 12 wires as required for electrified door hardware specified in hardware sets in Division 08: Openings. Provide sufficient number of concealed wires to accommodate electric function of specified hardware. Wire nut connections are not acceptable.
   i. Doors in wet or humid areas shall have a top cap and solid foam interior core to prevent internal moisture accumulation and galvannealed.
   j. Edge profile shall be provided on both vertical edges of door as follows:
      1) Single-acting swing doors: Beveled 1/8 inch in 2 inches.
   k. Hardware Reinforcements:
      1) Doors shall be mortised, reinforced, drilled, and tapped at factory for fully template hardware. Where surface-mounted hardware is to be applied, doors shall have reinforcing plates only.
      2) Minimum gauges for hardware reinforcing plates shall be as follows:
         (a) Hinge and pivot reinforcements: 7 gauge.
         (b) Reinforcements for lock face, flush bolts, concealed holders, concealed or surface-mounted closers: 12 gauge.

4. Glass Moldings and Stops: Loose stops shall be not less than 20-gauge steel, with butt corner joints, secured to frame opening by countersunk screws. Snap-on attachments will not be acceptable.
5. Louvers: Shall be inverted "V" blade, sight-proof type, unless noted otherwise.
6. Edge Clearances:
    a. Between door and frame at head and jambs: 1/8 inch.
    b. At doorsills with no threshold: 5/8 inch to 3/4 inch above finished floor.
    c. At doorsills with threshold: As required to suit threshold.
    d. Between meeting edges of double doors: 1/8 inch.

C. Finish:
1. Shop paint steel (whether galvanized or ungalvanized) stops and accessories as follows:
    a. Clean surfaces free of mill scale, rust, oil, grease, dirt, and other foreign matter.
    b. Chemically treat surfaces and apply one (1) coat of an approved baked-on rust-inhibitive primer paint to provide a minimum 0.5 mil dry film thickness.
2. Field painted under Section 09 90 00 - Painting and Coating.

D. Sound Rated Door: STC of 32, measured in accordance with ASTM E413.

E. Thermal Insulated Door: Total insulation R-Value of 44 measured in accordance with ASTM C1363, unless otherwise noted on Drawings.

2.5 LABELED DOORS AND FRAMES

A. Labeled doors and frames shall be provided for openings requiring fire protection ratings as scheduled and to comply with NFPA 80. Such doors and frames shall be constructed as tested and approved by UL, WHI, or other nationally recognized testing agency having a factory inspection service and approved by code authorities having jurisdiction and shall bear the appropriate permanent label.

B. If any door or frame scheduled to be fire-rated cannot qualify for appropriate labeling because of its size, design, hardware, or other reason, the Architect shall be so advised before fabrication work on that item is started. Indicate and highlight on shop drawing.

PART 3 - EXECUTION

3.1 COORDINATION

A. Coordinate the work of this Section.

B. Coordinate doors, frames, and windows with glazing specified in Section 08 80 00 - Glazing.

C. Coordinate doors and frames with painting specified in Section 09 90 00 - Painting and Coating.

3.2 INSTALLATION

A. Separate dissimilar metals. Protect against galvanic action.

B. Frames:
1. Anchorage and connections: Secure to adjacent construction. Where practical, interior door frames shall be flush with the pull side wall to minimize or eliminate the reveal and allow full 180 degree door swing.
2. Install frames in accordance with manufacturer’s instructions and install labeled frames in accordance with NFPA 80.
3. Frame spreader bars: Leave intact until frames are set perfectly square and plumb and anchors are securely attached.
4. Remove hardware, with the exception of prime-coated items, tag box, and reinstall after finish paint work is completed. Do not remove or paint over labels on labeled frames.

C. Doors:
1. Install hardware in accordance with hardware manufacturer's templates and instructions.
2. Install doors in accordance with manufacturer’s instructions and install labeled doors in accordance with NFPA 80.

3. Adjust operable parts for correct function.
4. Remove hardware, with the exception of prime-coated items, tag, box, and reinstall after finish paint Work is completed. Do not remove or paint over labels on labeled doors.

3.3 ADJUST AND CLEAN

A. Adjust doors for proper operation, free from binding or other defects.

B. Clean and restore soiled surfaces.

C. Remove scraps and debris, and leave site in clean condition.

END OF SECTION 08 11 13

SECTION 08 13 16 - ALUMINUM DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: Requirements including but not limited to:
   1. Swing doors systems.
   2. Accessories necessary for a complete installation.

1.3 REFERENCE STANDARDS

A. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.

B. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.

C. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).

D. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2023).

E. Texas Accessibility Standards (TAS) - 2012 Texas Accessibility Standards (TAS); 2012.

1.4 PERFORMANCE REQUIREMENTS

A. Performance: Aluminum-framed systems shall withstand the effects of specified performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:
   1. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
   2. Dimensional tolerances of building frame and other adjacent construction.
   3. Failure includes the following:
      a. Deflection exceeding specified limits.
      b. Thermal stresses transferring to building structure.
      c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
      d. Noise or vibration created by wind and by thermal and structural movements.
      e. Loosening or weakening of fasteners, attachments, and other components.
      f. Sealant failure.
      g. Failure of operating units.

B. Structural Loads: Verify with Structural Engineer
   1. Wind Loads: As indicated on Drawings.

C. Deflection of Framing Members:
   1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane shall not exceed L/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch , whichever is less.
   2. Deflection Parallel to Glazing Plane: Limited to L/360 of clear span or 1/8 inch , whichever is less.

D. Structural Test Performance: Provide aluminum framed systems tested according to ASTM E330/E330M as follows:

1. When tested at positive and negative wind load design pressures, systems do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not fewer than 10 seconds.

E. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E283/E283M at a minimum static-air-pressure difference of 6.24 lbf/sq. ft.

F. Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..

G. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 degrees F, ambient; 180 degrees F , material surfaces.
2. Interior Ambient-Air Temperature: 75 degrees F.

H. Condensation Resistance: Provide exterior aluminum framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 45 when tested according to AAMA 1503.

I. Thermal Conductance: Provide aluminum framed systems with fixed glazing and framing areas having an average U-factor of not more than 0.57 Btu/sq. ft. x h x degrees F when tested according to AAMA 1503.

1.5 SUBMITTALS

A. Product Data: Technical data for each type of product indicated including construction details, material descriptions, dimensions of individual components and profiles, and finishes for aluminum framed systems.

B. Shop Drawings: Submit aluminum-framed storefront and entrance shop drawings including plans, elevations, sections, full size details, and attachments to other work.
1. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.
2. For entrance doors, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.

C. Maintenance Data: For aluminum framed systems to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements:
1. Accessibility Requirements: Comply with applicable requirements.
a. U.S. Architectural and Transportation Barriers Compliance Board Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG).
b. ICC/ANSI A117.1 Accessible and Useable Building and Facilities.
c. Texas Accessibility Standards (TAS).

B. Installer Qualifications: Installer having minimum 10 years documented experience who is an authorized representative of the manufacturer and is trained and approved for installation of units required.

C. Engineering Responsibility: Prepare data for aluminum framed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated.

D. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in service performance.
   1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.

E. Source Limitations: Obtain aluminum-framed storefronts and entrances from single source from single manufacturer to the greatest extent possible.

F. Pre-Installation Conference: Conduct conference at site.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for aluminum framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 WARRANTY

A. Warranty: Written warranty signed by Manufacturer, Contractor, and Installer in which manufacturer agrees to repair or replace components of aluminum framed systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including, but not limited to, excessive deflection.
      b. Noise or vibration caused by thermal movements.
      c. Water leakage through fixed glazing and framing areas.
      d. Failure of operating components.
   2. Warranty Period: 10 years from date of Substantial Completion.

B. Finish Warranty: Written warranty signed by manufacturer in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.
   1. Warranty Period: 20 years from date of Substantial Completion.

1.9 MAINTENANCE SERVICE

A. Entrance Door Hardware:
   1. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of entrance door hardware.
   2. Initial Maintenance Service: Beginning at Substantial Completion, provide six months full maintenance by skilled employees of entrance door hardware Installer. Include quarterly preventive maintenance, repair, or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper entrance door hardware operation at rated speed and capacity. Provide parts and supplies the same as those used in the manufacture and installation of original equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Specifications are based on products of manufacturers named as the Basis of Design. Manufacturers listed whose products meet or exceed the specifications are approved for use on the Project. Other manufacturers must have a minimum of ten (10) years’ experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.

1. Kawneer North America.
2. Old Castle Building Envelope.
3. Tubelite, Inc.
4. US Aluminum Corporation.
5. Vistawall.

B. Basis of Design:
1. Thermal Doors: “Insulpour 500 T” manufactured by Kawneer.
2. Non-Thermal Doors: “500 Standard Entrance” manufactured by Kawneer.

C. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
1. Sheet and Plate: ASTM B209/B209M.
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221 (ASTM B221M).
3. Extruded Structural Pipe and Tubes: ASTM B429/B429M.
4. Structural Profiles: ASTM B308/B308M.

D. Framing Members: Extruded aluminum framing members of thickness required and reinforced necessary to support imposed loads.
1. Construction: Thermally broken for exterior conditions, non-thermal for interior conditions, unless noted otherwise.
2. Glazing System: Retained mechanically with gaskets on four sides.

E. Accessories:
1. Brackets and Reinforcements: High-strength aluminum with non-staining, non-ferrous shims for aligning system components.
2. Fasteners and Accessories: Corrosion resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.
    a. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
    b. Reinforce members as required to receive fastener threads.
3. Concrete and Masonry Inserts: Hot dip galvanized cast iron, malleable iron, or steel inserts, complying with ASTM A123/A123M or ASTM A153/A153M.
4. Concealed Flashing: Corrosion resistant, non-staining, non-bleeding flashing compatible with adjacent materials.
5. Framing System Gaskets and Sealants: Recommended by manufacturer for joint type.

F. Glazing: Refer to Section 08 80 00 - Glazing.
1. Exterior Doors: Provide with insulating glazing units.
2. Interior Doors: Provide with tempered glazing.
3. Glazing Gaskets: Compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.
4. Spacers and Setting Blocks: Elastomeric type.

G. Doors: Glazed doors for manual swing operation.
1. Door Construction:
    a. Thermal Doors: 2-1/4 inch overall thickness, with minimum 0.125 inch thick, extruded aluminum tubular rail and 5 inch wide stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
    b. Non-Thermal Doors: 1-3/4 inch overall thickness, with minimum 0.125 inch thick, extruded aluminum tubular rail and 5 inch wide stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
2. Door Design: Wide stile; 5 inch nominal width.
3. Accessible Doors: Smooth surfaced for width of door in area within 10 inches above floor or ground plane.

4. Glazing Stops and Gaskets: Square, snap on, extruded aluminum stops and preformed gaskets.

H. Accessories:
1. Joint Sealants: For installation at perimeter of aluminum framed systems, refer to Section 07 92 00 - Joint Sealants.
2. Bituminous Paint: Cold applied, asphalt mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30 mil thickness per coat.

2.2 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Framing Members: Fabricate components that, when assembled, have specified characteristics:
1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
6. Provisions for field replacement of glazing from interior for vision glass and exterior for spandrel glazing or metal panels.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
8. Provide sill receptors with end dams at all sill conditions.

C. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

D. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
1. At exterior doors, provide weather stripping, sweeps, and accessible thresholds.
2. At interior doors, provide gasketing to prevent metal to metal contact.

E. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
1. At pairs of exterior doors, provide compression type weather stripping retained in adjustable strip and mortised into door edge.
2. At exterior doors, provide weather sweeps applied to door bottoms.

F. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.3 ALUMINUM FINISHES

A. Factory Finish: Finish to match storefront, window wall, or curtain wall system in which entry system is installed.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements for installation tolerances and conditions affecting performance of the work. Proceed with installation after correcting unsatisfactory conditions.

3.2 INSTALLATION

A. Comply with aluminum framed storefront manufacturer recommended installation instructions. Coordinate installation with curtain wall work.
1. Do not install damaged components.
2. Fit joints to produce hairline joints free of burrs and distortion.
3. Rigidly secure non-movement joints.

4. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
5. Seal joints watertight unless otherwise indicated.

B. Metal Protection:
1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed as specified in Section 07 92 00 - Joint Sealants to produce weathertight installation.

E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.

F. Install glazing as specified in Section 08 80 00 - Glazing.

G. Entrance Doors and Hardware: Install doors to produce smooth operation and tight fit at contact points.
1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field Installed Entrance Door Hardware: Install surface mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

H. Install perimeter joint sealants as specified in Section 07 92 00 - Joint Sealants to produce weathertight installation.

3.3 ERECTION TOLERANCES

A. Install aluminum framed systems to comply with the following maximum erection tolerances:
1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet 1/4 inch over total length.
2. Alignment:
a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch.
b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch .

B. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.

3.4 ADJUSTING

A. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer.
1. For entrance doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70 degree open position to 3 inches from the latch, measured to the leading door edge.

END OF SECTION 08 13 16

SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. WI Certified, fire-rated and non-rated, flush panel wood doors.
   2. Solid core doors with MDF and plastic laminate faces.
   3. Integration of a security system.
   4. Factory fitting flush wood doors to frames and factory machining for hardware.
   5. Accessories necessary for a complete installation.

B. Related Sections:
   1. Section 05 50 00 - Metal Fabrications.
   2. Section 07 92 00 - Joint Sealants.
   3. Section 08 11 13 - Hollow Metal Doors and Frames.
   4. Section 08 80 00 - Glazing.
   5. Section 09 21 16 - Gypsum Board Assemblies.

1.3 REFERENCE STANDARDS

A. ANSI A208.1 - American National Standard for Particleboard; 2022.

B. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.

C. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2022.

D. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.

E. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

F. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

1.4 SUBMITTALS

A. Product Data:
   1. Technical data for each type of door indicated:
      a. Include details of core and edge construction, louvers, and trim for openings.
      b. Include factory finishing specifications.
      c. Include laboratory test report results of hinge loading, cycle/slam, stile edge screw withdrawals, and stile edge split resistance for fire rated doors.

B. Shop Drawings:
   1. Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:
      a. Dimensions and locations of blocking.
      b. Dimensions and locations of mortises and holes for hardware.
      c. Dimensions and locations of cutouts.
      d. Undercuts.
      e. Requirements for veneer matching.
      f. Doors to be factory finished and finish requirements.
      g. Fire-protection ratings for fire rated doors.

C. Certificate of Compliance for Fire Rated Doors: Provide copies of Certificate of Compliance for fire rated door assemblies and smoke and draft control door assemblies.

D. Certificate of Compliance regarding WI construction grade.

E. Certificate of Compliance regarding WI installation requirements.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Fire rated wood doors - NFPA 80 listed and labeled by UL for fire protection ratings indicated, based on testing at positive pressure according to UL 10C:
      a. Oversize fire rated door assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
      b. Temperature rise limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 degrees F (250 degrees C) above ambient after 30 minutes of standard fire-test exposure.
   2. Smoke and draft control door assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.
   3. Accessibility requirements - comply with applicable requirements:
      a. Americans with Disabilities Act of 1990, as amended:
         1) ADA Title II Regulations & the 2016 ADA Standards for Accessible Design.
   4. Quality standard: In addition to requirements specified, comply with Woodwork Institute WI Manual of Millwork
   5. Maintain at least one copy of WI Manual for reference at jobsite throughout installation period.

B. Source Limitations: Obtain flush wood doors through one (1) source from a single manufacturer.

C. Pre-Installation Conference: Conduct conference at site.

1.6 WARRANTY

A. Warranty:
   1. Written warranty signed by manufacturer, installer, and Contractor, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship. A representative of the door manufacturer shall inspect the installed doors and shall note on the warranty that no provisions of the warranty have been nullified in the manufacture and/or installation:
      a. Failures include, but are not limited to, the following:
         1) Warping (bow, cup, or twist) more than 1/4-inch in a 42-inch by 84-inch
         2) Telegraphing of core construction in face veneers exceeding 0.01-inch in a three-inch span.
      b. Warranty include installation and finishing that may be required due to repair or replacement of defective doors.
      c. Warranty period for solid core exterior doors: Five (5) years from date of Substantial Completion.
      d. Warranty period for solid core interior doors: Life of installation.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect wood doors during transit, storage, and handling to prevent damage, soiling, and deterioration. Store wood doors on a flat level surface in a dry, well ventilated, place. Keep wood doors a minimum of 3-1/2 inches off floor surface and protected by a protective covering under the bottom door and over the top door. Covering should protect wood doors from dirt, water, and abuse but allow for air circulation under and around the stack. Do not store wood doors in direct sunlight. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in heavy duty cardboard cartons prior to shipment from factory. Mark each door on top and bottom rail with opening number used on shop drawings using temporary, removable, or concealed markings.

C. Handle wood doors with clean gloves. Lift and carry wood doors when moving them around the site; do not drag wood doors across one another.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
   1. Flush Wood Doors:
      a. Haley Brothers, Inc.
      b. Oshkosh Door Company.
      c. Oregon Door.
      d. Weyerhaeuser.
      e. VT Industries.

B. Substitutions: Refer to section 01 25 00 - Substitution Procedures.
   1. Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution.

2.2 MATERIALS

A. Fire Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
   1. Cores: Provide core specified or mineral core as necessary to provide fire protection rating indicated.
   2. Edge construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
   3. Pairs: Provide fire retardant stiles listed and labeled for applications indicated without formed steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
   4. Pairs:
      a. Provide formed steel edges and astragals with intumescent seals:
         1) Finish steel edges and astragals with baked enamel same color as doors.
         2) Finish steel edges and astragals to match door hardware (locksets or exit devices).

B. Smoke and Draft Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.

C. Particleboard Core Doors:
   1. Blocking:
      a. Provide wood blocking in particleboard core doors as necessary to eliminate through-bolting hardware:
         1) 5-inch (5")top rail blocking in all doors, whether or not closers are scheduled.
         2) 5-inch (5") bottom rail blocking, in exterior doors and doors indicated to have protection plates.
         3) 5-inch (5") midrail blocking, in doors indicated to have exit devices.
         4) 4-1/2 inch by 10 inch lock blocks, in doors indicated with lock and latch sets.
   2. Provide doors with glued wood stave or structural composite lumber cores instead of particleboard cores for doors indicated to receive exit devices.

D. Fire Rated Wood Doors with Plastic Laminate Face - Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C:
   1. Core: Noncombustible mineral product complying with requirements and testing and inspecting agency for fire protection rating indicated.

2. Blocking:
    a. Provide composite blocking with improved screw-holding capability approved for use in doors of fire protection ratings indicated as follows:
        1) 5 inch top rail blocking in all doors, whether or not closers are scheduled.
        2) 5 inch (bottom rail blocking, in doors indicated to have protection plates.
        3) 5 inch midrail blocking, in doors indicated to have exit devices.
        4) 4-1/2 inch by 10 inch lock blocks, in doors indicated with lock and latch sets.
3. Edge Construction:
    a. Provide fire rated door edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges:
        1) At hinge stiles, provide laminated edge construction with improved screw holding capability and split resistance:
            (a) Screw holding capability: 550 lbf per WDMA T.M.-10.
        2) Pairs:
            (a) Provide fire retardant stiles listed and labeled for applications indicated without formed steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges. Where required, provide formed steel edges and astragals with intumescent seals. Finish steel edges and astragals with baked enamel.
4. Smoke and draft control door assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.

2.3 WOOD VENEER-FACED DOORS (TRANSPARENT FINISH)

A. Particleboard Core Doors with Wood Veneer Face:
1. Grade and construction: WI custom grade, PC-5; 1-3/4 inch unless otherwise indicated.
2. Core - ANSI A208.1, particleboard or MDF, made with binder containing no urea formaldehyde resin: Provide doors with glued block or structural composite lumber cores instead of particleboard cores at locations where exit devices are indicated.
3. Blocking:
    a. Provide wood blocking in particleboard core doors necessary to eliminate through bolting hardware:
        1) 5 inch top rail blocking. in all doors, whether or not closers are scheduled.
        2) 5 inch bottom rail blocking in doors indicated to have protection plates.
        3) 5 inch midrail blocking, in doors indicated to have exit devices.
        4) 4-1/2 inch by 10 inch (lock blocks, in doors indicated with lock and latch sets.
4. Construction: Five (5) plies. Bond stiles and rails to core, then abrasive plane entire unit before faces and crossbands are applied. Bond faces to core using a hot press.
5. Crossbanding: Minimum 1/16-inch thick, low density hardwood, composite, or high density hardboard.
6. Face: Wood Veneer.
    a. Basis of Design: VT Industries.
    b. Species: Red Oak.
    c. Cut: Plain Sliced (Flat Cut).
    d. Finish: ON18, Onyx.
7. Exposed Vertical and Horizontal Edges:
    a. Material: Wood veneer.
    b. Finish: Match face.

2.4 PAINTED DOORS (OPAQUE FINISH)

A. Particleboard Core Doors with Painted Finish:
1. Grade and construction: AWI custom grade, PC-5; 1-3/4 inch unless otherwise indicated.
2. Core - ANSI A208.1, particleboard or MDF, made with binder containing no urea formaldehyde resin: Provide doors with glued block or structural composite lumber cores instead of particleboard cores at locations where exit devices are indicated.

3. Blocking:
    a. Provide wood blocking in particleboard core doors necessary to eliminate through bolting hardware:
        1) Five-inch top rail blocking in all doors, whether or not closers are scheduled.
        2) Five-inch bottom rail blocking in doors indicated to have protection plates.
        3) Five-inch midrail blocking, in doors indicated to have exit devices.
        4) 4-1/2-inch by ten-inch lock blocks, in doors indicated with lock and latch sets.
4. Construction: Five (5) plies. Bond stiles and rails to core, then abrasive plane entire unit before faces and crossbands are applied. Bond faces to core using a hot press.
5. Crossbanding: Minimum 1/16 inch thick, low density hardwood, composite, or high density hardboard.
6. Face: Paint grade medium density overlay (MDO).

2.5 LIGHT FRAMES AND LOUVERS

A. Metal Frames for Light Openings: Manufacturer’s standard frame formed of 0.048 inch thick, cold-rolled steel sheet; factory primed for paint.

B. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048 inch thick, cold-rolled steel sheet; factory primed for paint with baked-enamel or powder-coated finish, and approved for use in doors of fire-protection rating indicated.

C. Metal Louvers:
1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
    a. Air Louvers; a Division of the Activar Construction Products Group.
    b. L & L Louvers.
    c. McGill Architectural Products.
    d. Approved equal.
2. Blade Type: Vision-proof, inverted V.
3. Metal and finish: Hot-dip galvanized steel, 0.040 inch thick, factory primed for paint with baked-enamel or powder-coated finish.
4. Metal and finish: Extruded aluminum with Class II, clear anodic finish, AA-M12C22A31.

D. Louvers for Fire-Rated Doors - Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire-protection rating of 1-1/2 hours and less:
1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
    a. Air Louvers; a Division of the Activar Construction Products Group.
    b. L & L Louvers, Inc.
    c. McGill Architectural Products.
    d. Approved equal.
2. Metal and Finish: Hot-dip galvanized steel, 0.040-inch thick, factory primed for paint with baked-enamel or powder-coated finish.

2.6 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated:
1. Comply with NFPA 80 requirements for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame shop drawings, BHMA-156.115-W, and hardware templates:
1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
2. Metal astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

C. Transom and Side Panels:

1. Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles:
    a. Fabricate door and transom panels with full-width, solid-lumber, rabbeted, meeting rails. Provide factory-installed spring bolts for concealed attachment into jambs of metal door frames.

D. Openings:
1. Factory cut and trim openings through doors:
    a. Light openings: Trim openings with moldings of material and profile indicated.
    b. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 08 80 00 - Glazing.
    c. Louvers: Factory install louvers in prepared openings.

E. Exterior Doors:
1. Factory treat exterior doors with water repellent after fabrication has been completed but before shop priming or factory finishing:
    a. Flash top of out-swinging doors with manufacturer's standard metal flashing.

2.7 SHOP PRIMING

A. Doors for Opaque Finish: Shop prime faces, all four edges, edges of cutouts, and mortises with one (1) coat of wood primer specified in Section 09 90 00 - Painting and Coating.

B. Doors for Transparent Finish: Shop prime faces and all four edges with stain (if required), other required pretreatments, and first coat of finish as specified in Section 09 90 00 - Painting and Coating. Seal edges of cutouts and mortises with first coat of finish.

2.8 FACTORY FINISHING

A. General – For factory finish doors, factory finish doors that are indicated to receive transparent finish, and factory finish doors where indicated in schedules or on Drawings as factory finished:
    a. Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing:
        1) Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Transparent Finish:
1. Grade: Premium.
2. Finish: WI's Architectural Woodwork Standards System 9, UV curable, acrylated epoxy, polyester, or urethane; refer to Drawings for finish designation.
3. Staining: As selected by the Architect from manufacturer's full range.
4. Effect: Semi-filled finish, produced by applying an additional finish coat to partially fill the wood pores.
5. Sheen: Semigloss.

C. Opaque Finish:
1. Grade: Premium.
2. Finish: AWMAC's and WI's Architectural Woodwork Standards System 10, UV curable, water based; refer to Drawings for finish designation.
3. Color: As selected by the Architect from manufacturer's full range.
4. Sheen: Semigloss.

PART 3 - NEXECUTION

3.1 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and

maintaining ambient temperature and humidity conditions at occupancy levels during remainder of construction period.

3.2 EXAMINATION

A. Examine doors and installed door frames, with installer present, before hanging doors:
   1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
   2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Installation Instructions:
   1. Install doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated:
      a. Install fire-rated doors according to NFPA 80.
      b. Install smoke and draft-control doors according to NFPA 105.

B. Job-Fitted Doors:
   1. Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining:
      a. Clearances:
         1) Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 3/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated:
            (a) Comply with NFPA 80 for fire-rated doors.
      b. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
      c. Bevel fire-rated doors 1/8 inch in 2 inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.

C. Factory Fitted Doors: Align in frames for uniform clearance at each edge.

D. Factory Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.4 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08 14 16

SECTION 08 31 00 - ACCESS DOORS AND PANELS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Wall- and ceiling-mounted access units.
   2. Floor-mounted access door and frame units, interior and exterior.

1.3 SUBMITTALS

A. Refer to Section 01 33 00 - Submittal Procedures for submittal procedures.

B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.

C. Shop Drawings: Indicate exact position of each access door and/or panel unit.

D. Samples: Submit two access units, 6 by 6 inches in size indicating frame configuration.

E. Manufacturer's Installation Instructions: Indicate installation requirements.

F. Project Record Documents: Record actual locations of each access unit.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
   1. Access Units:
      a. ACUDOR Products Inc: www.acudor.com.
      b. BAUCO Access Panel Solutions Inc.: www.accesspanelsolutions.com.
      c. Nystrom, Inc: www.nystrom.com.
      d. Studco Building Systems: www.studcosystems.com.

B. Substitutions: Refer to section 01 25 00 - Substitution Procedures.
   1. Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution

2.2 ACCESS DOOR AND PANEL ASSEMBLIES

A. General:
   1. The following access panel types are for selection as required whether or not indicated on Drawings. The Contractor shall evaluate the specific requirements and provide the appropriate system based on the condition, as all types may not be required on the project. The inclusion of any of the listed access panel types does not necessarily imply that the condition exists in the scope of work.
   2. Location: As indicated on Drawings or as required to access building systems.
   3. Size: 24 inches by 24 inches unless noted otherwise.

2.3 FLOOR-MOUNTED ACCESS UNITS

A. Floor-Mounted Access Units: Factory fabricated, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
   1. Size: As indicated on drawings.
   2. Hardware: Steel, hot-dipped galvanized.

B. Exterior Floor-Mounted Access Units: Aluminum, minimum 1/4 inch thick.

1. Design Load: Design to support live load of 300 psf with deflection not to exceed 1/180 of span.
2. Operation: Manual opening, and manual closing.
3. Cover Pattern: Diamond tread plate, with custom lettering.
4. Finish: Mill finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that rough openings are correctly sized and located.

B. Begin installation only after substrates have been properly prepared, and if the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to proceeding with this work.

B. Prepare surfaces using methods recommended by manufacturer for applicable substrates in accordance with project conditions.

3.3 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Install frames plumb and level in openings, and secure units rigidly in place.

C. Position units to provide convenient access to concealed equipment when necessary.

END OF SECTION 08 31 00

SECTION 08 34 73 - SOUND CONTROL DOOR ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Sound controls doors and frames.
   2. Accessories as required for a complete installation.

1.3 REFERENCE STANDARDS

A. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus; 2019.

B. ASTM D1735 - Standard Practice for Testing Water Resistance of Coatings Using Water Fog Apparatus; 2021.

C. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).

D. ASTM E336 - Standard Test Method for Measurement of Airborne Sound Attenuation Between Rooms in Buildings; 2023.

E. ASTM E413 - Classification for Rating Sound Insulation; 2022.

F. ASTM E512 - Standard Practice for Combined, Simulated Space Environment Testing of Thermal Control Materials with Electromagnetic and Particulate Radiation; 1994.

G. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.

H. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

I. ASTM International (ASTM):
   1. A36 Standard Specification for Carbon Structural Steel.
   2. A108 Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
   3. A1008 Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
   4. A1011 Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
   5. E336 Standard Test Method for Measurement of Airborne Sound Insulation in Buildings.

J. American Welders Society (AWS).

K. Hollow Metal Manufacturers Association (HMMA): 840 Installation and Storage of Hollow Metal Doors and Frames.

L. National Fire Protection Agency (NFPA): NFPA 80 Standard for Fire Doors and Fire Windows.

M. Underwriters Laboratories, Inc. (UL): UL Directory.

1.4 SUBMITTALS

A. Product Data:
   1. Manufacturer’s specifications and other data needed to prove compliance with specified requirements and manufacturer’s installation instructions.
   2. Manufacturer’s installation instructions.

B. Shop Drawings: Indicate elevations, sections, substrates, fasteners, finishes, hardware, and installation details.

C. Samples: Samples or color charts showing full range of colors available for Architect’s selection.

D. Certifications:
   1. Manufacturer's certification that door construction utilized has been tested at an independent laboratory in accordance with ASTM E90, and that the STC determined in accordance with ASTM E413 is not less than that specified in Part 2 of this Section.
   2. Manufacturer's certification that door construction has been tested in accordance with ASTM E512 (UL 10B) for labeled fire doors and frames, and meets requirements of NFPA 80 where required.

1.5 PERFORMANCE REQUIREMENTS

A. Acoustic Performance: Measure per ASTM E336.
   1. Refer to Door Schedule for STC requirements.

B. Opening Protective: UL labeled, rating as indicated in Door Schedule.

1.6 QUALITY ASSURANCE

A. Pre-Installation Conference: Refer to Section 01 31 00 - Project Management and Coordination.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store all materials on planks or dunnage in a dry location in a vertical position, spaced by blocking to permit air circulation between units. Cover all materials or store in a controlled area to protect from damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
   1. Metal Sound Control Door Assemblies:
      a. AMBICO Limited: www.ambico.com.
      b. Krieger Specialty Products Company: www.kriegerproducts.com.
      c. Overly Door Company: door.overly.com.
      d. Wenger Corporation: www.wengercorp.com.

2.2 BASIS OF DESIGN

A. Products manufactured by Wenger Corporation.

2.3 FABRICATION AND COMPONENTS

A. Design Features:
   1. Vision Lite Configuration: As indicated on Drawings.
   2. Hinges: Continuous cam-lift hinges.
   3. Seals: Continuous dual magnetic seals.
   4. Design Features:
      a. Innovative isolating crimp design provides a structural connection with minimum sound transmission between panels.
      b. Absorptive material integrated into the door frame between magnetic seals.
      c. High quality magnetic seals and hinges provide long life with minimum adjustments (typically once every five years or 100,000 cycles).
      d. Split-frame design for easier installation in many types of wall construction from 4 inches to 12-1/2 inches in thickness.
      e. Stainless steel sill plate included.
      f. Integrated frame support for sill plate.
      g. Fiberglass backed Teflon® sweep seal to minimize friction in opening and closing the door.
      h. Door leaf shall be constructed of 12 gauge and 14 gauge steel skins.
      i. Door frame shall be constructed of 14 gauge steel.

j. Vision lites shall be constructed of one (1) lite of 1/4 inch thick and 3/8 inch thick laminated safety glass.
k. Mortise pocket is standard for easy lever set integration.

5. Sizes: 3 feet 0 inches by 7 feet 0 inches, 3 feet 6 inches by 7 feet 0 inches, and 4 feet 0 inches by 7 feet 0 inches as indicated or scheduled on Drawings.

2.4 FINISH

A. Finish: All tool marks and surface imperfections shall be removed, and exposed faces of all welded joints shall be dressed smooth. Assemblies shall be treated and coated on all accessible surfaces with a rust-inhibitive primer that meets ASTM B117 salt spray for 150 hours, and ASTM D1735 water fog test for organic coatings for 200 hours, and that is fully cured prior to shipment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install Work of this Section in accordance with manufacturer's instructions and approved shop drawings.

B. Secure the services of a qualified representative of the manufacturer to visit the jobsite and instruct the Contractor's personnel in proper installation and adjustment of the doors and assist, if required, in field tests.

END OF SECTION 08 34 73

SECTION 08 43 13 - ALUMINUM-FRAMED STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements including but not limited to:
   1. Exterior and interior storefront framing.
   2. Exterior and interior manual swing entrance doors.
   3. Accessories necessary for a complete installation.

B. Related Sections:
   1. Section 05 12 00 - Structural Steel Framing.
   2. Section 05 40 00 - Cold Formed Metal Framing.
   3. Section 05 50 00 - Metal Fabrications.
   4. Section 07 62 00 - Roof Related Sheet Metal.
   5. Section 07 92 00 - Joint Sealants.
   6. Section 08 13 16 - Aluminum Doors.

1.3 REFERENCE STANDARDS

A. 2012 TAS - Texas Accessibility Standards; 2012.

B. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.

C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

D. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

E. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

F. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

G. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

H. ASTM B429/B429M - Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube; 2020.

I. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).

J. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2023).

1.4 SUBMITTALS

A. Product Data: Technical data for each type of product indicated including construction details, material descriptions, dimensions of individual components and profiles, and finishes for aluminum framed systems.

B. Shop Drawings:
   1. Submit aluminum storefront framing and entrances shop drawings including plans, elevations, sections, full size details, and attachments to other work:
      a. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.

b. For entrance doors, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.

C. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

D. Engineer's calculations of performance requirements.

E. Maintenance Data: For aluminum framed systems to include in maintenance manuals.

1.5 PERFORMANCE REQUIREMENTS

A. Aluminum framed systems shall withstand the effects of specified performance requirements without exceeding performance criteria or fail due to defective manufacture, fabrication, installation, or other defects in construction:
   1. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
   2. Dimensional tolerances of building frame and other adjacent construction.
   3. Failure includes the following:
      a. Deflection exceeding specified limits.
      b. Thermal stresses transferring to building structure.
      c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
      d. Noise or vibration created by wind and by thermal and structural movements.
      e. Loosening or weakening of fasteners, attachments, and other components.
      f. Sealant failure.
      g. Failure of operating units.

B. Structural Loads: Refer to Drawings.

C. Deflection of Framing Members:
   1. Deflection normal to wall plane: Limited to edge of glass in a direction perpendicular to glass plane shall not exceed L/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
   2. Deflection parallel to glazing plane: Limited to L/360 of clear span or 1/8 inch, whichever is smaller.

D. Structural Test Performance - Provide aluminum framed systems tested according to ASTM E330/E330M as follows:
   1. When tested at positive and negative wind load design pressures, systems do not evidence deflection exceeding specified limits.
   2. When tested at 150 percent of positive and negative wind load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
   3. Test durations: As required by design wind velocity, but not fewer than 10 seconds.

E. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft.) of fixed wall area when tested according to ASTM E331 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft.

F. Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.

G. Thermal Movements:
   1. Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base

engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss:
   a. Temperature change (range): 120 degrees F, ambient; 180 degrees F, material surfaces.
   b. Interior ambient-air temperature: 75 degrees F.

H. Condensation Resistance: Provide aluminum framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 45 when tested according to AAMA 1503.

I. Thermal Conductance: Provide aluminum framed systems with fixed glazing and framing areas having an average U-factor of not more than 0.57 Btu/sq. ft. x h x degrees F when tested according to AAMA 1503.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Accessibility requirements:
      a. U.S. Architectural and Transportation Barriers Compliance Board Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG).
      b. ICC/ANSI A117.1 Accessible and Useable Building and Facilities.

B. Installer Qualifications: Installer having minimum 10 years' documented experience who is an authorized representative of the manufacturer and is trained and approved for installation of units required.

C. Engineering Responsibility: Prepare data for aluminum framed systems, including shop drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated.

D. Product Options:
   1. Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in service performance:
      a. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.

E. Source Limitations: Obtain aluminum framed entrances from single source from single manufacturer.

F. Pre-Installation Conference: Conduct conference at site.

1.7 WARRANTY

A. Written warranty signed by manufacturer, Contractor, and installer in which manufacturer agrees to repair or replace components of aluminum framed systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including, but not limited to, excessive deflection.
      b. Noise or vibration caused by thermal movements.
      c. Water leakage through fixed glazing and framing areas.
      d. Failure of operating components.
   2. Warranty period: 2 years from date of Substantial Completion.

B. Written warranty signed by manufacturer in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering:
   1. Warranty period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Manufacturers:
   1. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
      a. Kawneer: www.kawneer.us.
      b. Oldcastle BuildingEnvelope: www.obe.com.
      c. Tubelite, Inc.: www.tubeliteusa.com.
      d. US Aluminum Corporation: www.usalum.com.
      e. YKK America AP, Inc.: www.ykkap.com.
   2. Substitutions: Refer to section 01 25 00 - Substitution Procedures.
      a. Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution.

B. Basis of Design:
   1. Standard Systems:
      a. Trifab VersaGlaze 451 and 451T manufactured by Kawneer.

C. General:
   1. Maximum design pressure +/- 45 psf.
   2. Refer to Drawings for frame size and locations. Subject to compliance with requirements, provide comparable storefront system by one of the following:

D. Aluminum:
   1. Alloy and temper recommended by manufacturer for type of use and finish indicated:
      a. Sheet and plate: ASTM B209/B209M.
      b. Extruded bars, rods, profiles, and tubes: ASTM B221/ASTM B221M.
      c. Extruded structural pipe and tubes: ASTM B429/B429M.

E. Framing Members:
   1. Extruded aluminum framing members of thickness required and reinforced necessary to support imposed loads:
      a. Construction: Non-Thermal or Thermal, as indicated on Drawings.
      b. Glazing system: Retained mechanically with gaskets on four sides.
      c. Glazing Plane: Front.

F. Accessories:
   1. Brackets and reinforcements: High strength aluminum with nonstaining, nonferrous shims for aligning system components.
   2. Fasteners and accessories:
      a. Corrosion resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials:
         1) Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
         2) Reinforce members as required to receive fastener threads.
   3. Concrete and masonry inserts: Hot dip galvanized cast iron, malleable iron, or steel inserts, complying with ASTM A123/A123M or ASTM A153/A153M.
   4. Concealed flashing: Corrosion resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
   5. Framing system gaskets and sealants: Recommended by manufacturer for joint type.

G. Glazing:
   1. Refer to Section 08 80 00 - Glazing for impact resistant laminated insulating glaxing units
   2. Glazing Gaskets: Compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.

3. Spacers and Setting Blocks: Elastomeric type.

H. Entrance Doors:
1. Refer to Section 08 13 16 - Aluminum Doors.

I. Accessories:
1. Joint Sealants: For installation at perimeter of aluminum framed systems, refer to Section 07 92 00 - Joint Sealants.
2. Bituminous Paint: Cold applied, asphalt mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30 mil thickness per coat.

2.2 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Framing Members:
1. Fabricate components that, when assembled, have specified characteristics:
a. Profiles that are sharp, straight, and free of defects or deformations.
b. Accurately fitted joints with ends coped or mitered.
c. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
d. Physical and thermal isolation of glazing from framing members.
e. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
f. Provisions for field replacement of glazing from interior for vision glass and exterior for spandrel glazing or metal panels.
g. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
h. Provide sill receptors with end dams at all sill conditions.

C. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

D. Storefront Framing: Fabricate components for assembly using screw spline system.

E. Entrance Door Frames:
1. Reinforce as required to support loads imposed by door operation and for installing entrance door hardware:
a. At exterior doors, provide weather stripping at fixed stops.
b. At interior doors, provide weather stripping at stops to prevent metal to metal contact.

F. After fabrication, clearly mark components to identify their locations in Project according to shop drawings.

2.3 ALUMINUM FINISHES

A. Color: As indicated on Drawings.

B. Touch-Up Materials: As recommended by coating manufacturer for field application.

PART 3 - EXECUTION

3.1 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for aluminum framed systems by field measurements before fabrication and indicate measurements on shop drawings.

3.2 EXAMINATION

A. Examine areas and conditions for compliance with requirements for installation tolerances and conditions affecting performance of the work. Proceed with installation after correcting unsatisfactory conditions.

3.3 INSTALLATION

A. Comply with aluminum framed storefront manufacturer recommended installation instructions. Coordinate installation with curtain wall work:
   1. Do not install damaged components.
   2. Fit joints to produce hairline joints free of burrs and distortion.
   3. Rigidly secure nonmovement joints.
   4. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
   5. Seal joints watertight unless otherwise indicated.
   6. Min anchorage #8 with 2 inch minimum embedment; minimum 2 inches from edges. Refer to shop drawings.

B. Metal Protection:
   1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
   2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed as specified in Section 07 92 00 - Joint Sealants to produce weathertight installation.

E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.

F. Install glazing specified in Section 08 80 00 - Glazing.

G. Entrance Doors and Hardware:
   1. Install doors to produce smooth operation and tight fit at contact points:
      a. Exterior doors: Install to produce weathertight enclosure and tight fit at weather stripping.
      b. Field installed entrance door hardware: Install surface mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

H. Install perimeter joint sealants as specified in Section 07 92 00 - Joint Sealants to produce weathertight installation.

3.4 ERECTION TOLERANCES

A. Install aluminum framed systems to comply with the following maximum erection tolerances:
   1. Location and plane: Limit variation from true location and plane to 1/8 inch in 12 feet ; 1/4 inch over total length.
   2. Alignment:
      a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch .
      b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch .

B. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.

3.5 ADJUSTING

A. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer:
   1. For entrance doors accessible to people with disabilities, adjust closers to provide a 3 second closer sweep period for doors to move from a 70 degree open position to 3 inches from the latch, measured to the leading door edge.

3.6 MAINTENANCE SERVICE

A. Entrance Door Hardware:

1. Maintenance tools and instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of entrance door hardware.
2. Initial maintenance service: Beginning at Substantial Completion, provide six (6) months full maintenance by skilled employees of entrance door hardware installer. Include quarterly preventive maintenance, repair, or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper entrance door hardware operation at rated speed and capacity. Provide parts and supplies the same as those used in the manufacture and installation of original equipment.

END OF SECTION 08 43 13

SECTION 08 44 13 - GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Aluminum-framed curtain wall, with vision glazing and glass, metal, and stone infill panels.

B. Related Sections:
   1. Section 08 80 00 - Glazing.

1.3 REFERENCE STANDARDS

A. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site; 2015.

B. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.

C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

E. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015.

F. ASTM C793 - Standard Test Method for Effects of Laboratory Accelerated Weathering on Elastomeric Joint Sealants; 2023.

G. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

H. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2023.

I. ASTM C1135 - Standard Test Method for Determining Tensile Adhesion Properties of Structural Sealants; 2015.

J. ASTM C1184 - Standard Specification for Structural Silicone Sealants; 2023.

K. ASTM C1249 - Standard Guide for Secondary Seal for Sealed Insulating Glass Units for Structural Sealant Glazing Applications; 2018 (Reapproved 2023).

L. ASTM C1401 - Standard Guide for Structural Sealant Glazing; 2023.

M. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.

N. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.5 SUBMITTALS

A. Refer to Section 01 33 00 - Submittal Procedures for submittal procedures.

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, internal drainage details, glazing, and infill.

C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.

D. Shop Drawings: Provide details of proposed structural sealant glazing (SSG) and weather sealant joints indicating dimensions, materials, bite, thicknesses, profile, and support framing.

E. Test Reports: Submit results of full-size mock-up testing. Reports of tests previously performed on the same design are acceptable.

F. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.

G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Accessibility Requirements: Comply with applicable requirements.
      a. Texas Accessibility Standards (TAS) 2012.

B. Designer Qualifications: Design curtain wall and its structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed at the State in which the Project is located.

C. Verify that each component is appropriate for use in structural sealant glazing (SSG) application in regards to at least the following properties; size, shape, dimensions, material, self-life, storage conditions, and color.

D. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.7 MOCK-UPS

A. See Section 01 40 00 - Quality Requirements for additional requirements.

B. Provide mock-up including each component being used on the project. Assemble to illustrate component assembly including glazing materials, weep drainage system, attachments, anchors, and perimeter sealant.

C. Locate on-site where directed by Architect; mock-up may remain as part of the Work.

D. Locate off-site where directed, and remove when directed.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.9 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.10 WARRANTY

A. Refer to Section 01 77 00 - Closeout Procedures and Checklist for additional warranty requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Specifications are based on the products identified as Basis of Design. Manufacturers listed whose products meet or exceed the specifications are approved for use in the Work. Other manufacturers must have a minimum of five (5) years' experience manufacturing products

meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.

1. Arcadia, Inc: www.arcadiainc.com/#sle.
2. Boyd Aluminum: www.boydaluminum.com/#sle.
3. Coral Architectural Products, a division of Coral Industries, Inc: www.coralap.com/#sle.
4. HMI: www.hmiglass.com/#sle.
5. Kawneer North America: www.kawneer.com/#sle.
6. Manko Window Systems, Inc: www.mankowindows.com/#sle.
7. Oldcastle Building Envelope: www.oldcastlebe.com/#sle.
8. Pittco Architectural Metals Inc: www.pittcometals.com/#sle.
9. Solar Innovations, Inc: www.solarinnovations.com/#sle.
10. Tubelite, Inc: www.tubeliteinc.com/#sle.
11. Trulite Glass & Aluminum Solutions, LLC: www.trulite.com/#sle.
12. Unicel Architectural Corp: www.unicelarchitectural.com/#sle.

B. Substitutions: Refer to section 01 25 00 - Substitution Procedures.

2.2 CURTAIN WALL

A. Aluminum-Framed Curtain Wall: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.

1. Outside glazed, with pressure plate and mullion cover, where indicated on Drawings.
2. Inside glazed, with pressure plate and mullion cover, where indicated on drawings.
3. Structural sealant glazing (SSG) adhesive on two (2)-sides, with temporary glazing stops, and pressure plate and mullion cover on 2-sides, where indicated on drawings.
4. Structural sealant glazing (SSG) adhesive on four (4)-sides, with temporary glazing stops, where indicated on drawings.
5. Fabrication Method: Shop/factory unitized system.
6. Glazing Method: Field glazed system.
7. Finish: Class I natural anodized.
    a. Factory finish surfaces that will be exposed in completed assemblies.
    b. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
8. Provide flush joints and corners, weather sealed, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for imposed loads.
9. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
10. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.

B. Structural Performance Requirements: Design and size components to withstand the following load requirements without damage or permanent set.

1. Design Wind Loads: Refer to Structural.
    a. Measure performance by testing in accordance with ASTM E330/E330M, using test loads equal to 1.5 times the design wind loads and 10 second duration of maximum pressure.
    b. Member Deflection: For spans less than 13 feet 6 inches, limit member deflection to flexure limit of glass in any direction, and maximum of 1/175 of span or 3/4 inch, whichever is less and with full recovery of glazing materials.
    c. Member Deflection: For spans over 13 feet 6 inches and less than 40 feet, limit member deflection to flexure limit of glass in any direction, and maximum of 1/240 of span plus 1/4 inch, with full recovery of glazing materials.
2. Movement: Accommodate the following movement without damage to components or deterioration of seals:
    a. Expansion and contraction caused by 180 degrees F surface temperature.

b. Expansion and contraction caused by cycling temperature range of 170 degrees F over a 12 hour period.
c. Movement of curtain wall relative to perimeter framing.
d. Deflection of structural support framing, under permanent and dynamic loads.

3. Structural Sealant Glazing (SSG) System: For individual glass lites, design framing members to not exceed a deflection normal to the wall of L/175 between supports with 3/4 inch maximum, and a deflection parallel to the wall of L/360 with 1/8 inch maximum, whichever is less.

C. Water Penetration Resistance on Manufactured Assembly: No uncontrolled water on indoor face when tested as follows:
1. Test Pressure Differential: 10 psf.

D. Air Leakage: 0.06 cfm/sq ft maximum leakage of wall area when tested in accordance with ASTM E283/E283M at 6.27 psf pressure difference across assembly.

2.3 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.

B. Glazing:
1. Types: Refer to Section 08 80 00 - Glazing.
2. Locations: Refer to Drawings.

2.4 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).

B. Structural Sealant Glazing (SSG) Adhesive: Neutral curing, silicone sealant formulated for SSG applications in compliance with ASTM C1184 and structural glazing industry guidelines, ASTM C1401.
1. SSG adhesive in compliance with ASTM C920; Type S - Single-component, Grade NS, Class 50, Use NT, G, and A.
2. Ultimate Tensile Strength: Minimum of 50 psi as determined by test method ASTM C1135 under the following conditions.
a. Exposure to air temperatures of 190 degrees F and minus 20 degrees F.
b. Water immersion for seven (7) days, minimum.
c. Exposure to weathering for 5,000 hours, minimum.
3. Sealant Design Tensile Strength: 20 psi, maximum.
4. Hardness: 20 to 60 with Type A-2 durometer in compliance with test method ASTM C661.
5. SSG sealant tested for compatibility with glazing accessories in compliance with ASTM C1087, tested for accelerated weathering in compliance with ASTM C793, and in compliance with insulating glass secondary sealant design standards of ASTM C1249.

C. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

D. Glazing Accessories: See Section 08 80 00.

2.5 FINISHES

A. Color: As indicated on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other related work.

B. Verify that curtain wall openings and adjoining water-resistive and air barrier seal materials are ready to receive work of this section.

C. Verify that anchorage devices have been properly installed and located.

3.2 INSTALLATION

A. Install curtain wall system in accordance with manufacturer's instructions.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form watertight dam.

G. Structural Sealant Glazing (SSG) Adhesive: Install structural sealant glazing adhesive and weather seal sealant in accordance with manufacturer's instructions.

H. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.3 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 0.5 inches per 100 ft, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

C. Sealant Space Between Curtain Wall Mullions and Adjacent Construction: Maximum of 3/4 inch and minimum of 1/4 inch.

3.4 FIELD QUALITY CONTROL

3.5 ADJUSTING

A. Adjust operating sash for smooth operation.

3.6 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths, take care to remove dirt from corners, and wipe surfaces clean.

C. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

3.7 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION 08 44 13

SECTION 08 71 13 - POWER DOOR OPERATORS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Operators for swinging doors.
   2. Controllers, actuators, and safety devices.
   3. Maintenance.

1.3 DEFINITIONS

A. Activation Device: Device that sends an electrical signal to door operator to open door when actuated.

B. Knowing Act: Consciously initiating the opening of a power-operated door using acceptable methods, including wall-mounted switches such as push plates and controlled access devices such as keypads, card readers, and key switches.

1.4 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. BHMA A156.10 - Power Operated Pedestrian Doors; 2017.

C. ITS (DIR) - Directory of Listed Products; Current Edition.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. UL (DIR) - Online Certifications Directory; Current Edition.

G. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate power door operators with balance of door hardware and electrical work required for each affected door opening.
   1. Templates: Check other sections' shop drawings to confirm that adequate provisions are in place for locating and installing power door operators.
   2. Electrical System Roughing-in: Coordinate layout and installation of power door operators with connections to power supplies, remote activation devices, and electric door latching hardware.

B. Preinstallation Meeting: Convene a preinstallation meeting one week prior to commencing work of this section; require attendance by affected installers.

1.6 SUBMITTALS

A. Refer to Section 01 33 00 - Submittal Procedures for submittal procedures.

B. Shop Drawings:
   1. Indicate layout and dimensions; head, jamb, and sill conditions; elevations; components, anchorage, recesses, materials, and finishes, electrical characteristics and connection requirements.
   2. Identify installation tolerances required, assembly conditions, routing of service lines and conduit, and locations of operating components and boxes.

C. Product Data: Provide data on system components, sizes, features, and finishes.

D. Samples: Two samples of exposed to view hardware and attachment hardware.

E. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention, and manufacturer's hardware and component templates.

F. Exterior Product Approvals:
   1. Manufacturer shall certify that product complies with and has been tested and approved in compliance with Florida Product Approval or Miami Dade NOA and applicable requirements.
   2. Exterior Product Approvals: Manufacturer shall certify that product complies with large and small missile impact criteria and has been tested and approved in compliance with Florida Product Approval or Miami Dade NOA and applicable requirements.

G. Maintenance contract.

H. Project Record Documents: Record actual locations of concealed equipment, services, and conduit.

I. Maintenance Data: Include manufacturer's parts list and maintenance instructions for each type of hardware and operating component.

J. Specimen warranty.

K. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Refer to Section 01 60 00 - Product Requirements for additional provisions.
   2. Wrenches and other tools required for maintenance of equipment.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience, and a member of AAADM.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience and approved by manufacturer.

1.8 WARRANTY

A. Refer to Section 01 77 00 - Closeout Procedures and Checklist for additional warranty requirements.

B. Manufacturer Warranty: Provide 2-year manufacturer warranty for components of power door operators. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Specifications are based on the products identified as Basis of Design. Manufacturers listed whose products meet or exceed the specifications are approved for use in the Work. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.
   1. Operators for Swinging Doors:
      a. ASSA ABLOY Entrance Solutions: www.besam-usa.com/#sle.
      b. Detex Corporation: www.detex.com/#sle.
      c. DORMA USA, Inc: www.dorma.com/#sle.
      d. LCN, an Allegion brand: www.allegion.com/us/#sle.
      e. Horton Automatics: www.hortondoors.com/#sle.
      f. NABCO Entrances Inc: www.nabcoentrances.com/#sle.
      g. Portalp USA: www.portalpusa.com/#sle.
      h. Record-USA: www.recorddoors.com/#sle.
      i. Stanley Access Technologies: www.stanleyaccess.com/#sle.
   2. Operators for Sliding Doors:
   3. Operators for Folding Doors:

B. Substitutions: Refer to section 01 25 00 - Substitution Procedures.

2.2 POWER DOOR OPERATORS - GENERAL

A. Electrically Operated or Controlled Hardware: Provide necessary power supplies, relays, and interfaces as required for proper operation; provide wiring between control components and to building power connection in compliance with NFPA 70.

B. Comply with ADA Standards for egress requirements.

C. Comply with NFPA 101 and requirements of authorities having jurisdiction; provide units selected for actual door weight and for light pedestrian traffic unless otherwise indicated.

D. Exterior and Vestibule Doors: Provide equipment suitable for ambient operating temperature range of minus 20 to plus 140 degrees F.

E. Exterior Doors: Provide units capable of operating, closing, and holding doors closed under positive and negative differential pressure; if necessary, provide power closing.

F. System Integration: Integrate operator functionality with other systems as required for a complete working installation.
   1. Provide time delay relay to signal automatic door operator to activate only after electric lock system is released.
   2. Provide fire alarm interface configurable to safely open or close doors on signal from fire alarm system.
   3. Provide controller output signals at the door closed or door open positions to facilitate interaction with security and access control systems.

2.3 OPERATORS FOR SWINGING DOORS

A. Door Operator: Hydraulic.
   1. Applications: Include operators for single and double doors.
   2. Pneumatic/Hydraulic Operators: Low voltage control system, pneumatic activation to hydraulic device for opening and closing.
   3. Speed Control: Variable, field-adjustable opening and closing cycles.
   4. Functionality: Full-power open, spring close operation.
      a. Full-Power Operators: Comply with BHMA A156.10; safeties required.
         1) Comply with UL 325; acceptable evidence of compliance includes UL (DIR) or ITS (DIR) listing or test report by testing agency acceptable to authorities having jurisdiction.
         2) Force Required to Set Door in Motion When Unpowered: 30 lbf, maximum, measured at 1 inch from the latch edge of the door at any point in the closing cycle.
         3) Signage: Provide signage in accordance with BHMA A156.10.
   5. Mounting: Surface mounted overhead.
   6. Components:
      a. Header Case: Manufacturer's standard extruded aluminum profile containing door operator and door mounting components.
      b. Motor and Gearbox Assembly: Manufacturer's standard sealed motor, gearbox, and drive belt.
   7. Power Supply Units: Self-contained, electrically operated, and independent of door operator.
   8. Actuators: Manufacturer's standard.
      a. Push-Side Actuator: Mat switch.
      b. Pull-Side Actuator: Mat switch.
   9. Pull-Side Safety: Door mounted.

2.4 CONTROLLERS, ACTUATORS, AND SAFETY DEVICES

A. Controllers: Manufacturer's standard for products specified.
   1. Provide microprocessor operated controller for each door.

B. Actuators: Manufacturer's standard for products specified and as specified below.
   1. Comply with BHMA A156.10 for actuator and safety types and zones.

C. Safety Devices: Manufacturer's standard units recommended for project applications and conditions.
   1. Comply with BHMA A156.10 for actuator and safety types and zones.
   2. Photo-Electric Actuator/Safety: Horizontal single ray device, with aluminum housing for light source and relay units.
   3. Swinging Door Safety Device: Door-mounted proximity detector device arranged to prevent operation of door when persons or obstructions are in the swing zone.

2.5 FINISHES

A. Aluminum Finishes: Manufacturer's standard.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify installation conditions including, but not limited to the following: opening sizes, floor conditions, plumb and level mounting surfaces.

B. Verify that surfaces are ready to receive work and dimensions are as indicated on shop drawings.

C. Verify that electric power is available, in the correct location, and of the correct characteristics.

3.2 INSTALLATION

A. Coordinate installation of components with related and adjacent work.

B. Install equipment in accordance with manufacturer's instructions.

C. Provide for thermal expansion and contraction of door and frame units and live and dead loads that may be transmitted to operating equipment.

D. Provide for dimensional distortion of components during operation.

E. Install pneumatic lines and door power units in a manner to prevent condensation or freezing.

3.3 ADJUSTING

A. Adjust door equipment for correct function and smooth operation.

3.4 CLEANING

A. Remove temporary protection, clean exposed surfaces.

3.5 CLOSEOUT ACTIVITIES

A. Demonstrate toOwner's Designated Representative equipment operation, operating components, adjustment features, and lubrication requirements.

3.6 MAINTENANCE

A. Refer to Section 01 77 00 - Closeout Procedures for additional requirements relating to maintenance service.

B. Provide a separate maintenance contract for specified maintenance service.

C. Provide service and maintenance of operating equipment for one year from Date of Substantial Completion, at no extra charge to Owner.

END OF SECTION 08 71 13

SECTION 08 80 00 - GLAZING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: Requirements including but not limited to:
   1. Float Glass (GG).
   2. Tempered Glass (GT).
   3. Spandrel Glass (GS).
   4. Insulated Glass (GI).
   5. Laminated Safety Glazing (GL).
   6. Fire Resistant Glazing (GF).
   7. Glazing Sealants.
   8. Glass Film Overlay.
   9. Accessories necessary for a complete installation.

1.3 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.

B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015 (Reaffirmed 2020).

C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

D. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008 (Reapproved 2023).

E. ASTM C1036 - Standard Specification for Flat Glass; 2021.

F. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.

G. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2023.

H. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2019.

I. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2018.

J. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2021a.

K. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.

L. ASTM E1886 - Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials; 2019.

M. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes; 2023.

N. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2019.

O. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.

P. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.

Q. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2023.

R. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2014, with Errata (2017).

S. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2017.

1.4 DEFINITIONS

A. Glass Thickness: Indicated by thickness designations in millimeters according to ASTM C1036.

B. Interspace: Space between lites of an insulating glass unit.

1.5 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design glass panels including comprehensive engineering analysis by a qualified professional engineer lawfully licensed in the State of Texas, using performance requirements and design criteria indicated.

B. Installed Glazing: Design glazing systems to withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

C. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E1300.
   1. Design Wind Pressures: As indicated on Structural Drawings.
   2. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.
      a. Wind Design Data: As indicated on Structural Drawings.
      b. Basic Wind Speed: As indicated on Structural Drawings.
      c. Importance Factor: As indicated on Structural Drawings.
   3. Exposure Category: As indicated on Structural Drawings.
   4. Design Snow Loads: As indicated on Structural Drawings.
   5. Thickness of Patterned Glass: Base design of patterned glass on thickness at thinnest part of the glass.
   6. Probability of Breakage for Sloped Glazing: For glass surfaces sloped more than 15 degrees from vertical, design glass for a probability of breakage not greater than 0.001.
   7. Maximum Lateral Deflection: For glass supported on all four edges, limit center of glass deflection at design wind pressure to not more than 1/50 times the short side length or 1 inch (25 mm), whichever is less.

D. Windborne Debris Impact Resistance: Exterior glazing shall comply with -protection testing requirements in ASTM E1996 for when tested according to ASTM E1886. Test specimens shall be no smaller in width and length than glazing indicated for use on Project and shall be installed in same manner as glazing indicated for use on Project.
   1. Large Missile Test: For glazing located within 30 feet (9.1 m) of grade
   2. Small Missile Test: For glazing located more than 30 feet (9.1 m) above grade

E. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II

F. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
   1. For monolithic glass lites, properties are based on units with lites 6 mm thick.
   2. For laminated glass lites, properties are based on products of construction indicated.
   3. For insulating glass units, properties are based on units of thickness indicated for overall unit and for each lite.
   4. U-Factors: Center of glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
   5. Solar Heat Gain Coefficient and Visible Transmittance: Center of glazing values, according to NFRC 200 Nand based on LBL's WINDOW 5.2 computer program.
   6. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

1.6 SUBMITTALS

A. Product Data: Technical data for each type of product including recommended installation and cleaning procedures.

B. Glass Samples: For each type of glass required. Prepare samples from same material to be used for Work.

C. Glazing Schedule: List glass types and thickness for each size opening and location. Use same designations indicated on Drawings.

D. Delegated Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

E. Product Certificates: Submit glass product certificates required by Code.
   1. Glass Manufacturer Certificate: The glass manufacturer shall submit a letter certifying it has reviewed the glazing details proposed for the project, including the use of gaskets and sealants, and that each product furnished is recommended for the application shown and compliance with the Code.

F. Thermal Stress and Wind Load Analyses: Submit the following from the glass manufacturer:
   1. Thermal stress analysis for each exterior glass unit type, each building elevation. The analysis shall clearly indicate the expected service temperature ranges and the effects of partial and full shading on the glass.
      a. Attach to the thermal stress analysis a statement from the glass manufacturer that based upon this analysis that the resulting thermal stresses will not reduce the specified statistical probability of breakage.
   2. Wind load analysis for each glass unit type, each building elevation. The analysis shall indicate the statistical probability of breakage at the design wind pressure does not exceed the specified statistical probability of breakage.

G. Product Test Reports: Submit test reports for insulating glass and glazing sealants, for tests performed by a qualified testing agency.
   1. Glazing Sealants: Provide test reports based on testing current sealant formulations within previous 36 month period.
   2. Glazing Sealants: Preconstruction adhesion and compatibility test report.

1.7 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Building Code: Comply with applicable requirements of the IBC for glazing.
   2. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
      a. As a minimum provide Category II materials complying with testing requirements in 16 CFR 1201 (Consumer Product Safety Commission Safety Standard for Architectural Glazing Materials, published in the Code of Federal Regulations) and ANSI Z97.1.
      b. Permanently mark safety glass with certification label of Safety Glazing Certification Council.
   3. Insulating Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
   4. Glazing Publications: Comply with published recommendations of glass product organizations
      a. GANA: Glazing Manual.
      b. IGMA: SIGMA TM-3000 Vertical Glazing Guidelines.
      c. GANA: Laminated Glazing Reference Manual.
      d. AAMA: AAMA GDSG-1 Glass Design for Sloped Glazing.
      e. AAMA: TIR A7 Sloped Glazing Guidelines.
      f. IGMA for Sloped Glazing: IGMA TB-3001 Guidelines for Sloped Glazing.

g. IGMA for Insulating Glass: SIGMA TM-3000 North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use.

5. Fire Rated Door Assemblies: Assemblies complying with NFPA 80 listed and labeled by UL for fire ratings indicated, based on testing according to NFPA 252.
6. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.
   a. Minimum Glass Thickness for Exterior Lites: 6 mm.
   b. Thickness of Tinted Glass: Provide same thickness for each tint color indicated.
7. Strength: Where annealed float glass is indicated, provide annealed float glass, heat strengthened float glass, or fully tempered float glass necessary to comply with performance requirements.
   a. Where heat strengthened float glass is indicated, provide heat strengthened float glass or fully tempered float glass necessary to comply with performance requirements.
   b. Where fully tempered float glass is indicated, provide fully tempered float glass.

B. Manufacturer Qualifications for Insulating Glass Units with Sputter Coated, Low E Coatings: Insulating glass manufacturer who is approved and certified by coated glass manufacturer.

C. Installer Qualifications, Glazer: Experience entity having minimum 5 years documented experience and who employs glass installers certified under the National Glass Association's Certified Glass Installer Program.

D. Installer Qualifications, Decorative Film: Experience entity having minimum 5 years documented experience in the installation of glass films.

E. Source Limitations for Glass and Glass Accessories: Obtain each type of glass and glass accessories from a single source.

F. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

G. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.

H. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.

I. Install glazing in mockups specified in to match glazing systems required for Project, including glazing methods.
   1. Subject to compliance with requirements, approved mockups may become part of the completed work if undisturbed at time of Substantial Completion.

J. Pre-Construction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass framing member for adhesion to and compatibility with elastomeric glazing sealants.
   1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
   2. Use ASTM C1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
   3. Test no fewer than eight Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
   4. Schedule enough time for testing and analyzing results to prevent delaying the Work.
   5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.

K. Pre-Installation Conference: Conduct conference at site.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Delivery: Deliver materials in manufacturer’s original, unopened, undamaged containers with identification labels intact.

C. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by manufacturer.

D. Exercise exceptional care to prevent edge damage to glass, and damage/deterioration to coating on glass.

E. Comply with insulating glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
   1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 degrees F .

B. Field Measurements: Verify actual dimensions of openings and construction contiguous with decorative glass by field measurements before fabrication.

1.10 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.11 WARRANTY

A. Coated Glass Products: Written warranty signed by manufacturer in which glass manufacturer agrees to replace coated glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
   1. Warranty Period: Ten (10) years from date of Substantial Completion

B. Laminated Glass: Written warranty signed by manufacturer in which manufacturer agrees to replace laminated glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
   1. Warranty Period: Ten (10) years from date of Substantial Completion.

C. Insulating Glass: Written warranty signed by manufacturer in which manufacturer agrees to replace insulating glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
   1. Warranty Period: Ten (10) years from date of Substantial Completion.

D. Glass Film: Written warranty signed by glass film manufacturer and installer in which manufacturer and installer agree to replace glass film that crack, peel, delaminate, discolor, change appearance, or failure to meet solar criteria within specified warranty period.
   1. Warranty Period: Five (5) years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Specifications are based on the products identified as Basis of Design. Manufacturers listed whose products meet or exceed the specifications are approved for use in the Work. Other manufacturers must have a minimum of five (5) years’ experience manufacturing products

meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.

1. Glass:
    a. Cardinal Glass Industries: www.https://www.cardinalcorp.com.
    b. Guardian Industries: www.guardianglass.com.
    c. Pilkington North America, a subsidiary of Nippon Sheet Glass Co., Ltd.: www.pilkington.com/#s.
    d. Vetrotech Saint-Gobain International AG: www.vetrotech.com.
    e. Vitro Architectural Glass: www.vitroglazings.com.
2. Fire Resistance Rated Glazing:
    a. AGC Glass Company North America, Inc.
    b. Pilkington North America, a subsidiary of Nippon Sheet Glass Co., Ltd.: www.pilkington.com/#sle.
    c. SAFTI FIRST Fire Rated Glazing Solutions.
    d. Schott North America, Inc.
    e. Technical Glass Products.
    f. Vetrotech Saint-Gobain International AG: www.vetrotech.com/#sle.
3. Glass Film:
    a. Bekaert Specialty Films: www.solargard.com.
    b. Eastman, a subsidiary of CPFilms, Inc.
    c. Madico: www.madico.com.
    d. Solyx Films, LLC.

B. Substitutions: Refer to section 01 25 00 - Substitution Procedures.

2.2 ACCEPTABLE FABRICATORS:

A. Manufacturer-certified fabricators.

2.3 MATERIALS

A. Clear, Annealed, Float Glass: ASTM C1036, Type I, Class 1 (clear), Quality-Q3.

B. Tinted Annealed Float Glass: ASTM C1036, Type I, Class 2 (tinted), Quality-Q3.

C. Fully-Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
    1. Fabrication Process: By horizontal (roller hearth) process with roll wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

2.4 INSULATING GLAZING UNITS

A. Insulating Glazing Units: Factory assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E2190.

B. Sealing System: Dual seal, with polyisobutylene and silicone primary and secondary sealants.
    1. Spacer: Aluminum with black, color anodic finish. Thermally broken aluminum
    2. Desiccant: Molecular sieve or silica gel, or a blend of both.
    3. Performance Properties: Refer to Glazing schedule.

C. Spandrel Glass:
    1. Silicone Coated Spandrel Glass: ASTM C1048, Type I, Condition C, Quality-Q3.
    2. Fallout Resistance: Provide spandrel units identical to those passing fallout resistance test for spandrel glass specified in ASTM C1048.

2.5 LAMINATED GLAZING

A. Laminated Glass: ASTM C1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
    1. Construction: Laminate glass with polyvinyl butyral interlayer, ionomeric polymer interlayer, or cast in place and cured transparent resin interlayer, as scheduled, to comply with interlayer manufacturer's written instructions.

2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
3. Interlayer Thickness: As required.
4. Interlayer Color: Clear unless otherwise indicated

B. Windborne Debris Impact Resistant Laminated Glass: Comply with requirements for laminated glass except laminate glass with ionomeric polymer interlayer to comply with interlayer manufacturer's written instructions:

2.6 GLAZING ACCESSORIES

A. Compatibility: Provide glazing sealants compatible with one another and with other materials in contact, including glass products, seals of insulating glass units, and glazing channel substrates, under conditions of service and application, demonstrated by sealant manufacturer based on testing and field experience.

B. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.

C. Colors of Exposed Glazing Sealants: As selected by Architect.

D. Glazing Sealant: Neutral curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 100/50, Use NT
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Dow Corning Corporation.
   b. GE Construction Sealants; Momentive Performance Materials Inc.
   c. May National Associates, Inc.; a subsidiary of Sika Corporation.
   d. Pecora Corporation.
   e. Sika Corporation.

E. Glazing Sealant: Neutral curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 50, Use NT.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. BASF Corporation; Construction Systems.
   b. Dow Corning Corporation.
   c. GE Construction Sealants; Momentive Performance Materials Inc.
   d. May National Associates, Inc.; a subsidiary of Sika Corporation.
   e. Pecora Corporation.
   f. Polymeric Systems, Inc.
   g. Sika Corporation.

F. Glazing Sealant: Neutral curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 25, Use NT.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Bostik, Inc.
   b. Dow Corning Corporation.
   c. GE Construction Sealants; Momentive Performance Materials Inc.
   d. May National Associates, Inc.; a subsidiary of Sika Corporation.
   e. Polymeric Systems, Inc.
   f. Schnee-Morehead, Inc., an ITW company.
   g. Sika Corporation.

G. Glazing Sealant: Acid curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 25, Use NT.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. BASF Corporation; Construction Systems.

b. Bostik, Inc.
c. Dow Corning Corporation.
d. GE Construction Sealants; Momentive Performance Materials Inc.
e. May National Associates, Inc.; a subsidiary of Sika Corporation.
f. Pecora Corporation.
g. Polymeric Systems, Inc.
h. Schnee-Morehead, Inc., an ITW company.
i. Sika Corporation.

H. Glazing Sealants for Fire-Resistance-Rated Glazing Products: Neutral curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 50, Use NT. Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Dow Corning Corporation.
b. GE Construction Sealants; Momentive Performance Materials Inc.
2. Colors of Exposed Glazing Sealants: As selected by Architect.

I. Back Bedding Mastic Glazing Tapes: Preformed, butyl based, 100 percent solids elastomeric tape; non-staining and non-migrating in contact with nonporous surfaces; with or without spacer rod recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:
1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

J. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

K. Miscellaneous Glazing Accessories: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with proven record of compatibility with surfaces contacted in installation.
1. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
2. Setting Blocks: Silicone, minimum 4 inches long and wide enough to fully support all lites of glazing unit.
3. Spacers: Silicone blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
4. Edge Blocks: Silicone material of hardness needed to limit glass lateral movement (side walking).
5. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
6. Perimeter Insulation for Fire Resistant Glazing: Product approved by testing agency listed and labeled fire resistant glazing product with which it is used for application and fire protection rating indicated.

2.7 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
   a. Temperature Change: 120 degrees F , ambient; 180 degrees F , material surfaces.
2. Edge and Surface Conditions: Comply with the recommendations of AAMA Structural Properties of Glass for clean cut edges, except comply with manufacturer's recommendations.
3. Exposed Glass Edges and Surface Condition: Finish edges flat with an arrissed edge profile (small bevel of uniform width not exceeding 1.5 mm at an angle of approximately 45 degrees to the surface of the glass) with polished (surface is reflective in appearance similar to the major surface of the glass) surface.

B. Cutting: Wheel cut or sawed edges and seamed at manufacturer's option. For site cut glass, provide glass 2 inches larger than required in both dimensions to facilitate cutting of clean cut edges without the necessity of seaming or nipping. Do not cut, seam, nip or abrade heat treated glass.

C. Butt Glazing: Clean cut or flat grind vertical edges of butt glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
   1. Edges: Grind smooth and polish exposed glass edges and corners.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
   1. Manufacturing and installation tolerances, including size, squareness, and offsets at corners.
   2. Presence and functioning of weep systems.
   3. Minimum required face and edge clearances.
   4. Effective sealing between joints of glass-framing members.

B. Proceed with installation after correcting unsatisfactory conditions.

3.2 PREPARATION

A. Clean glazing channels and framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
   1. Comply with manufacturer instructions for wiping of surfaces immediately before application of primers.
   2. Wipe metal surfaces with IPA (isopropyl alcohol) unless otherwise required by compatibility and adhesion testing results.

B. Inspect each piece of glass immediately before installation. Do not install pieces improperly sized or with damaged edges, scratches, abrasion, or evidence damage. Remove labels from glass immediately after installation.

C. Examine glazing units to locate exterior and interior surfaces. Label or mark units so exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

D. Seal vent (breather or capillary) tubes in insulating glass units in accordance with insulating glass manufacturer written recommendations.

E. Glass Film Preparation:
   1. Remove particulate matter on the glass surface using a scraping blade.
   2. Place an absorbent towel on window sill or sash to absorb moisture generated by the film application.

3.3 GLAZING

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches.
   1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
   2. Provide 1/8 inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

J. Where wedge shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
   1. Square cut wedge shaped gaskets at corners and install gaskets as recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

K. Tape Glazing: Position tapes on fixed stops so that, when compressed by glass, the exposed edges are flush with or protrude slightly above sightline of stops.
   1. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make tapes fit opening.
   2. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
   3. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
   4. Do not remove release paper from tape until right before each glazing unit is installed.
   5. Apply heel bead of elastomeric sealant.
   6. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
   7. Apply cap bead of elastomeric sealant over exposed edge of tape.

L. Gasket Glazing (Dry): Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
   1. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
   2. Installation with Drive in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce

a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

3. Installation with Pressure Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
4. Install gaskets to protrude past face of glazing stops.

M. Sealant Glazing (Wet): Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
1. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
2. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

N. Structurally Glazed Units: Set full height continuous structural gaskets/spacers to vertical mullions. Set glass units with void between edge of units and head/sill channel, but with units fully within head/sill rebate so as to provide a proper bite.
1. Align glass unit edges over vertical mullion continuous structural gasket/spacers and secure with manufacturers recommended temporary cleats.
2. Structurally seal glass unit to vertical mullions with specified one part structural silicone sealant. Tool structural silicone flush in alignment to mullion face and perpendicular to face of interior glass light; remove excess structural silicone from glass and metal substrates.
3. After full cure of structural silicone sealant remove temporary cleats. Immediately seal holes left in the vertical mullions caused by temporary cleats.
4. Insert and shape weatherseal joint backer rods, or gaskets, into vertical void between glass units and at a proper depth to receive silicone weatherseal sealant.
5. Place silicone weatherseal sealant into void and tool flush with adjacent exterior glass light faces; remove excess sealant from glass and metal substrates.

O. Glass Film Overlay: Apply squarely aligned to glass edges, uniformly smooth, and free from tears, air bubbles, wrinkles, and rough edges, in single sheet completely overlaying in pattern indicated on Drawings to the interior face of clean glass, according to manufacturer's written instructions, using the squeegee technique to remove moisture.
1. Cut film edges neatly and square at a uniform distance of 1/16 inch to 1/32 inch of the window sealing device. Avoid scoring glass when cutting film.

P. Erection Tolerances:
1. Maximum Deviation from Vertical: 1/8 inch in any story and 1/4 inch in any 45 foot run.
2. Maximum Deviation from Horizontal: 1/8 inch in any 30 foot run.
3. Maximum Deviation from True Alignment: 1/32 inch for any two (2) abutting units. Allow no edge projections.
4. Maximum Joint Gap: 1/32 inch.

3.4 CLEANING AND PROTECTION

A. Immediately after installation remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
1. If contaminating substances come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

PART 4 SCHEDULE

4.1 GLAZING SCHEDULE

A. Float Glass (GG):
   1. GG1: Float Glass: 1/4 inch clear float glass.
   2. GG2: Float Glass: 1/4 inch tinted float glass.
   3. GG3: Float Glass: 1 inch tinted float glass.

B. Insulating Glazing Units (GI):
   1. GI1: 1 inch thick insulating glazing unit comprised of a 1/4 inch thick glazing quality Low-e, tinted, tempered, float glass exterior lite with a 1/4 inch thick glazing quality clear tempered float glass interior lite, separated by a 1/2 inch air space and having the following properties:
      a. Performance Requirements:
         1) U-Factor: 0.50 (maximum).
         2) Solar Heat Gain Coefficient: 0.25 (maximum).
      b. Basis of Design: SunGuard SNX 51/23 manufactured by Guardian Advanced Architectural Glass.
         1) Color:
            (a) Exterior Lite: As selected by Architect from Manufacturer's full range of offerings.
            (b) Interior Lite: Clear.
         2) Visible Transmittance (%): 51.
         3) Winter Night-time U-value: 0.29 (air).
         4) Shading Coefficient: 0.27.
         5) Solar Heat Gain Coefficient: 0.23.
         6) Light to Solar Gain Ratio (LSG): 2.18.
   2. Type GI2: As GI-1 with light-diffusing material in cavity.
      a. Light-Diffusing Material: 1/4 inch PMMA acrylic UV stable capillary slab encased in fiber tissue. Capillaries not to exceed 1/8 inch diameter to ensure proper diffusion.
      b. Basis of Design: “Okalux Plus” manufactured by Okalux North America, Inc.

C. Laminated Safety Glazing (GL):
   1. GL1: 1/4 inch laminated safety glass comprised of two (2) 1/8“ glazing quality clear float glass lites, laminated to each side of a clear 0.03 inch polyvinyl butyral (PVB) interlayer.

D. Transparent One-Way Mirror (GO):
   1. GO1: Mirror quality float glass with pyrolytic (hard coat) type coating located on high light level surface of glass; ASTM C1376.
      a. Thickness: 1/4 inch.
      b. Glass Tint: Gray.
      c. Glass Type: Annealed.
      d. Lighting Ratio: Maintain at least 8:1 lighting level ratio between coated side (bright-observed side) and uncoated side (dim-observer side).
      e. Glazing Method: Gasket glazing.
      f. Basis of Design:

E. Spandrel Glazing (GS):
   1. GS1: Thermally-Insulated Spandrel Glazing: As GI-1 with water-based silicone coating (Opaci-Coat-300) on surface #4.
      a. Color: Warm Gray.

F. Tempered Glazing (GT):

1. Type GT2: 1/4 inch thick glazing quality, Low-e, tinted, tempered, float glass to match GI-1 above for use at exterior locations where GI-1 cannot be used, typical, except where indicated otherwise and having the following properties

END OF SECTION 08 80 00

SECTION 08 83 00 - MIRRORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Glass Mirrors.
      a. Annealed Float Glass.
      b. Tempered Safety Glass.
   2. Decorative mirrors.

B. Related Sections:

1.3 REFERENCE STANDARDS

A. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

B. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

D. ASTM C1036 - Standard Specification for Flat Glass; 2021.

E. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.

F. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).

G. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2024.

H. GANA (GM) - GANA Glazing Manual; 2022.

I. GANA (SM) - GANA Sealant Manual; 2008.

1.4 SUBMITTALS

A. Product Data on Mirror Types: Submit structural, physical and environmental characteristics, size limitations, special handling and installation requirements.

B. Product Data on Glazing Compounds: Submit chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.

C. Samples: Submit two samples, 3 x 3 inch in size, illustrating mirrors design, edging, and coloration.

D. Manufacturer's Certificate: Certify that mirrors, meets or exceeds specified requirements.

E. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner 's name and registered with manufacturer.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Refer to Section 01 60 00 - Product Requirements for additional provisions.
   2. Extra Mirror Glazing: One of each type and size.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with GANA (GM) and GANA (SM) for glazing installation methods.
   1. Maintain one copy on project site.

B. Fabricate, store, transport, receive, install, and clean mirrors in accordance with manufacturer's recommendations.

1.6 FIELD CONDITIONS

A. Do not install mirrors when ambient temperature is less than 50 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.7 WARRANTY

A. Refer to Section 01 77 00 - Closeout Procedures and Checklist for additional warranty requirements.

B. Provide five year manufacturer warranty for reflective coating on mirrors and replacement of same.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
   1. Mirrors:
      a. Binswanger Mirror/ACI Distribution: www.binswangerglass.com.
      b. GGI - General Glass International: www.generalglass.com.
      c. Lenoir Mirror Co.: www.lenoirmirror.com.
      d. Trulite Glass and Aluminum Solutions: www.trulite.com.

B. Substitutions: Refer to Section 01 25 13 - Product Substitution Procedures.
   1. Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution.

2.2 MATERIALS

A. Mirror Design Criteria: Select materials and/or provide supports as required to limit mirror material deflection to 1/200, or to the flexure limit of glass, with full recovery of glazing materials, whichever is less.

B. Mirror Glass: Clear, annealed float glass; ASTM C1036, with copper and silver coatings, and protective overcoating.
   1. Thickness: 1/4 inch.
   2. Edges: Arrised.
   3. Size: As indicated on Drawings.

C. Mirror Glass: ASTM C1036, Type 1 - Transparent Flat, Class 1 - Clear, Quality - Q1 (high-quality mirrors); silvering, protective coating, and quality requirements in compliance with ASTM C1503.
   1. Thickness: 1/4 inch.
   2. Size: As indicated on Drawings.

D. Decorative Mirror Glass: Clear, annealed float glass; ASTM C1036.
   1. Thickness: 1/4 inch.
   2. Pattern: Bianco e Nero - Antique.
   3. Edges: Chamfered arris.
   4. Size: As indicated on Drawings.

2.3 ACCESSORIES

A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness.

B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness.

C. Glazing Tape: Preformed butyl compound; 10 to 15 Shore A durometer hardness; on release paper.

D. Glazing Clips: Manufacturer's standard type.

E. Mirror Attachment Accessories: Stainless steel clips.

F. Mirror Adhesive: Silicone pre-polymer based, chemically compatible with mirror coating and wall substrate.
   1. Application Temperature: Minus 35 to 140 degrees F at contact surfaces.
   2. Volatile Organic Content (VOC): Less than 7 percent by weight.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that openings for mirrored glazing are correctly sized and within tolerance.

B. Verify that surfaces of mirror frames or recesses are clean, free of obstructions, and ready for installation of mirrors.

3.2 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous mirror frames or recesses with substrate compatible primer or sealer. Prime surfaces scheduled to receive sealant.

C. Prepare installation in accordance with ASTM C1193 for solvent release sealants, and install sealant in accordance with manufacturer's instructions.

3.3 INSTALLATION

A. Install mirrors in accordance with manufacturer's recommendations.

B. Set mirrors plumb and level, and free of optical distortion.

C. Set mirrors with edge clearance free of surrounding construction including countertops or backsplashes.

D. Frameless Mirrors: Set mirrors in proper place with adhesive, applied in accordance with adhesive manufacturer's instructions.

3.4 CLEANING

A. Remove wet glazing materials from finish surfaces.

B. Remove labels after work is complete.

C. Clean mirrors and adjacent surfaces.

END OF SECTION 08 83 00

SECTION 09 05 00 - COMMON WORK RESULTS FOR FINISHES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Substrate testing.
   2. Waterproof membranes.

B. Related Sections:
   1. Section 03 30 00 - Cast-In-Place Concrete: Concrete design, underslab vapor barrier and finished concrete surface required to accept flooring adhesive and finish flooring system.

1.3 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2022.

C. ASTM C1028 - Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method; 2007 - Not Active.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

E. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2023.

F. ASTM E699 - Standard Specification for Agencies Involved in Testing, Quality Assurance, and Evaluating of Manufactured Building Components; 2016.

G. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2022.

H. ASTM F1482 - Standard Practice for Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring; 2021.

I. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2023.

J. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.

K. ISO/IEC 17025 - General Requirements for the Competence of Testing and Calibration Laboratories; 2017.

1.4 SUBMITTALS

A. Product Data:
   1. Submit manufacturer's printed descriptions of materials, components and systems; performance criteria; use limitations; preparation instructions and recommendations; storage and handling requirements and recommendations; and installation methods.

B. Certificates:
   1. Submit with manufacturer’s signature certifying that each product and/or system meets the requirements of the performance characteristics, physical criteria, and applicable standards specified.
      a. Provide Master Grade Certificate as specified in ANSI A137.1.

C. Test and Evaluation Reports:

1. Submit certified test results by a recognized testing laboratory in accordance with specified test methods for each product and/or system indicating physical, chemical and performance characteristics.

D. Samples:
   1. Submit samples showing full range of color and texture variations expected.
   2. Full size units of each type and composition of tile and for each color and finish required.
   3. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required; minimum 12 inches square, but not fewer than four tiles. Use grout of type and in color or colors approved for completed Work.
   4. Waterproof membrane in 6 inch by 6 inch sample.
   5. Thresholds in 6 inch lengths.

E. Closeout Submittals:
   1. Operation and Maintenance Data: Including, but not limited to, methods for maintaining installed products and precautions against cleaning materials with methods detrimental to finishes and performance.
   2. Executed Warranty Documentation: Manufacturers' material warranties and installers workmanship warranty.
   3. Record Documents: Drawings, Specifications, Product Data.

1.5 PERFORMANCE REQUIREMENTS

A. Refer to the following for specific sub-flooring and finish flooring requirements:
   1. Section 03 30 00 - Cast-In-Place Concrete.

B. Static Coefficient of Friction (SCOF): For tile installed on walkway surfaces which are not anticipated to be wet, provide products with values determined by testing identical products per ASTM C1028:
   1. Level Surfaces: Minimum 0.6.
   2. Ramp Surfaces: Minimum 0.8.

C. Dynamic Coefficient of Friction (DCOF): Per ANSI A137.1 Section 9.6 DCOF AcuTest:
   1. Wet Level Surfaces: Minimum 0.42 unless noted otherwise.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Surface Burning Characteristics: ASTM E84; identify products with appropriate markings of applicable testing agency.
      a. Flame Spread Index: 25 or less.
      b. Smoke Developed Index: 450 or less.
   2. Accessibility Requirements: Comply with applicable requirements.
      a. ADA Standards.
      b. ICC/ANSI A117.1 Accessible and Useable Building and Facilities.

B. Qualifications:
   1. Installer / Applicator: Perform installation with skilled, experienced and trained workmen supervised by trained personnel who shall have a minimum three (3) years successful experience in installations of similar size and scope.
   2. Testing Agency: An independent testing agency with the experience and capability to conduct the testing indicated, meeting requirements of ISO/IEC 17025 or ASTM E329 and ASTM E699.

C. Source Limitations:
   1. Obtain spray-applied adhesive through one source from a single manufacturer.
   2. Obtain tile of same type and color or finish from one source or producer. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.

3. Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.
    a. Obtain each of the following products specified in this Section through one source from a single manufacturer for each product:
        1) Waterproofing.
        2) Joint sealants.
        3) Cementitious backer units.
        4) Metal edge strips.

D. Sustainability Standards and Certifications:
1. Adhesive and Sealant VOC Limits: According to South Coast Air Quality Management District Rule 1168 and GS-36 for aerosols.
2. VOC Limits: As tested using U.S. EPA Reference Test Method 24 and as defined by
    a. South Coast Air Quality Management District Rules: In areas where exposure to freeze/thaw conditions and direct exposure to moisture will not occur.
        1) SCAQMD Rule 1168, Adhesive and Sealant Applications
    b. California Air Resources Board: For areas where freeze/thaw conditions do exist or direct exposure to moisture can occur.
        1) CARB for containers 16 oz. or less.

E. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Build mockup of each type of floor tile installation.
2. Build mockup of each type of wall tile installation.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery, Storage and Handling per manufacturer’s recommendations, Section 01 60 00 - Product Requirements, and as follows:
1. Delivery and Acceptance Requirements
    a. Deliver materials to Project site in an undamaged condition, in original, unopened and undamaged packages or containers bearing manufacturer's intact label, names, brand names, types and thicknesses of contents, and proper handling, storing, unpacking, protecting, and installation instructions, as warranted.
        1) Comply with requirements in ANSI A137.1 for labeling tile packages.
    b. Inspect shipped materials on delivery to ensure compliance with requirements of Contract Documents and to ensure that products are undamaged and properly protected. Reject damaged goods and accept properly ordered, protected and undamaged goods.
2. Storage and Handling Requirements
    a. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided. Store liquid materials in unopened containers and protected from freezing.
    b. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.
    c. Store adhesive materials in a dry, temperature-controlled interior area at 65-80 deg F . Protect materials from damage from improper handling, exposure to temperature extremes, and the action of other trades.
3. Packaging Waste Management
    a. Request in writing that manufacturers, fabricators, suppliers and shippers provide least amount of packaging that adequately and properly protects, supports and contains the items shipped, and is reusable, returnable or recyclable.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

B. Contractor is required to achieve the specified concrete moisture content prior to installation of all flooring materials or use a flooring manufacture approved moisture barrier prior to installation of all flooring products.

C. Maintain temperatures at 50 degrees F or more in tiled areas during installation and for 7 days after completion, unless higher temperatures are required by referenced installation standard or manufacturer's instructions.

1.9 EXTRA STOCK

A. Refer to related sections for extra stock requirements.

1.10 PRE-INSTALLATION CONFERENCE

A. Refer to Section 01 31 00 - Project Management and Coordination.

1.11 WARRANTY

A. Refer to related sections for specific product warranty requirements.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 FIELD CONDITIONS

A. Conditions and Measurements: Visit jobsite to verify installation conditions and floor measurements.

B. Ambient Conditions per manufacturer’s written recommendations, and as follows:
   1. New concrete slabs shall be flat, clean and dry meeting all moisture tests passing manufacturer’s written requirements.
   2. Environmental Limitations: Maintain temperature and relative humidity per manufacturer’s recommendations.
      a. Maintain space, substrate temperatures, and RH for time prior to, during and after installation as recommended.
   3. Acclimate floor finish materials into spaces they will be installed a minimum 48 hours in advance of installation.
      a. Do not install until all floor finish materials are same temperature as space where they are to be installed.

3.2 EXAMINATION - GENERAL

A. Contractor shall examine preparatory work by others, with Installer/Applicator present, for compliance with requirements affecting Work performance.
   1. Contractor shall notify Architect of any issues which would affect installation of finish. Absence of such notification shall constitute acceptance of responsibility by Contractor.

B. Verify that field measurements, surfaces, substrates, structural support, tolerances, levelness, plumbness, temperature, humidity, moisture content level, cleanliness, and other conditions are as required by the manufacturer, and ready to receive Work.

3.3 EXAMINATION - FLOORING

A. Verify that concrete floors to receive resilient flooring meet ASTM F710 requirements and are flat as recommended by floor finish manufacturer.

B. Verify that wood and panel type underlayment substrates to receive resilient flooring meet ASTM F1482 requirements and are flat as recommended by floor finish manufacturer.

C. Test substrates as required by manufacturer to verify proper conditions.

1. Portland-Cement Concrete:
    a. Perform moisture testing to verify that concrete substrate is sound and dry. Both of the following tests are required:
        1) Perform relative humidity (RH) test using in situ probes per ASTM F2170 . Proceed with installation only after each substrate measures a maximum 75 percent RH.
        2) Perform anhydrous calcium chloride testing per ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 7 lbs of water/1000 sf in 24 hours.
    b. Perform alkalinity testing to verify pH level is 11 or below per ASTM F710.
    c. Perform bond testing per ASTM F710 to determine compatibility of adhesive to concrete substrate.
2. Wood Underlayment: Shall be dry, clean, structurally sound, well nailed and/or glued, free of voids and with joints that do not exceed 1/16 inch (1.6mm) per floor finish manufacturer's installation instructions.
3. Proceed with installation only after unsatisfactory conditions have been corrected.
    a. Commencement of work related to this Section will constitute acceptance of conditions.

3.4 INSTALLATION - GENERAL

A. Lay out tilng so that no tile is cut to less than 1/2 of its full size in either direction.

B. Slope tile within 3 foot diameter of a floor drain, unless otherwise noted.

C. Form internal angles square.

3.5 INSTALLATION - STONE SHRESHOLDS

A. Set marble thresholds in accordance with TCA TR611 and manufacturer's instructions.

3.6 FIELD QUALITY CONTROL

A. Site Tests and Inspections:
1. Inspect floor finish system installation for non-conforming Work including, but not limited to, the following:
    a. Lack of adequate adhesion.
    b. Adhesive overspray.
        1) Clean off water-based adhesive overspray with a damp cloth.
    c. Improper substrate preparation as indicated by:
        1) Air blisters.
        2) Buckling.
        3) Cracks.

3.7 CLEANING

A. Clean finishes as required and in accordance with manufacturer's recommendations.

3.8 CLOSEOUT ACTIVITIES

A. Refer to Section 01 77 00 - Closeout Procedures and Checklist.

END OF SECTION 09 05 00

SECTION 09 05 61 - COMMON WORK RESULTS FOR FLOORING PREPARATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. This section applies to floors identified in Contract Documents that are receiving the following types of floor coverings:
      a. Carpet tile.
   2. Remediation of concrete floor slabs due to unsatisfactory moisture or alkalinity (pH) conditions.
      a. Contractor shall perform all specified remediation of concrete floor slabs. If such remediation is indicated by testing agency's report and is due to a condition not under Contractor's control or could not have been predicted by examination prior to entering into the contract, a contract modification will be issued.
   3. Remedial floor coatings.
   4. Remedial floor sheet membrane.
   5. Crack isolation membrane.

1.3 REFERENCE STANDARDS

A. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2014 (Reaffirmed 2019).

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordinate scheduling of cleaning and testing, so that preliminary cleaning has been completed for at least 24 hours prior to testing.

1.5 SUBMITTALS

A. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
   1. Moisture and alkalinity (pH) limits and test methods.
   2. Manufacturer's required bond/compatibility test procedure.

B. Remedial Materials Product Data: Manufacturer's published data on each product to be used for remediation.
   1. Manufacturer's qualification statement.
   2. Manufacturer's statement of compatibility with types of flooring applied over remedial product.
   3. Test reports indicating compliance with specified performance requirements, performed by nationally recognized independent testing agency.
   4. Manufacturer's installation instructions.
   5. Specimen Warranty: Copy of warranty to be issued by coating manufacturer and certificate of underwriter's coverage of warranty.

C. Adhesive Bond and Compatibility Test Report.

D. Floor Moisture Testing Technician Certificate: International Concrete Repair Institute (ICRI) Concrete Slab Moisture Testing Technician- Grade I certificate.

1.6 PERFORMANCE REQUIREMENTS

A. Refer to the following for specific sub-flooring and finish flooring requirements:
   1. Section 03 30 00 - Cast-In-Place Concrete.
   2. Section 06 10 00 - Rough Carpentry: Sub-flooring.
   3. Section 09 68 00 - Carpeting.

1.7 QUALITY ASSURANCE

A. Contractor may perform adhesive and bond test with Contractor's own personnel or hire a testing agency.

B. Testing Agency Qualifications: Independent testing agency experienced in the types of testing specified.
   1. Submit evidence of experience consisting of at least 3 test reports of the type required, with project Owner's project contact information.
   2. Acceptable Testing Agencies:
      a. Other testing agency approved by Owner.
      b. Substitutions: Not permitted.

C. Floor Moisture Testing Technician Qualifications: International Concrete Repair Institute (ICRI) Concrete Slab Moisture Testing Technician Certification- Grade I.

D. Remedial Coating Installer Qualifications: Company specializing in performing work of the type specified in this section, trained by or employed by coating manufacturer, and able to provide at least 3 project references showing at least 3 years' experience installing moisture emission coatings.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, handle, and protect products in accordance with manufacturer’s instructions and recommendations.

B. Deliver materials in manufacturer’s packaging; include installation instructions.

C. Keep materials from freezing.

1.9 FIELD CONDITIONS

A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F or more than 85 degrees F.

B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.

B. Substitutions: Refer to section 01 25 00 - Substitution Procedures.
   1. Manufacturers and fabricators not listed must have a minimum of 5 years’ experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution

2.2 MATERIALS

A. Alternate Flooring Adhesive: Floor covering manufacturer's recommended product, suitable for the moisture and pH conditions present; low-VOC. In the absence of any recommendation from flooring manufacturer, provide a product recommended by adhesive manufacturer as suitable for substrate and floor covering and for conditions present.

B. Spray-Applied Adhesive:
   1. Water-based pressure-sensitive aerosol adhesive, VOC- Free, non-flammable, and non-HAP, emitting no dangerous fumes or odors.
   2. Manufacturers:
      a. Spray-Lock by Interlock Industries, Inc., (706) 517-8989.

C. Remedial Floor Coating: Single- or multi-layer coating or coating/overlay combination intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring

manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.

1. Thickness: 1/8 inch, maximum.
2. Thickness: As required for application and in accordance with manufacturer's installation instructions.
3. Use product recommended by testing agency.
4. Basis of Design:
    a. Custom Building Products; TechMVC Moisture Vapor and Alkalinity Barrier: www.custombuildingproducts.com/#sle.
    b. H.B. Fuller Construction Products, Inc; TEC LiquiDam with TEC Level Set 200 SLU: www.tecspecialty.com/#sle.
    c. Sika Corporation; Sikafloor Moisture Tolerance Epoxy Primer and Sikafloor Self-Leveling Moisture Tolerant Resurfacer: www.sikafloorusa.com/#sle.
    d. UZIN UTZ NORTH AMERICA, INC; UZIN PE 460 with UZIN PE 280 and UZIN NC 170 LevelStar: us.uzin.com/#sle.

D. Remedial Floor Sheet Membrane: Pre-formed multi-ply sheet membrane installed over concrete subfloor and intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.

1. Thickness: 28 mil (0.028 inch).
2. Tape: Types recommended by underlayment manufacturer to install membrane and cover seams.
3. Basis of Design:
    a. GCP Applied Technologies; Kovara MBX: www.gcpat.com/#sle.

E. Crack Isolation Membrane:

1. Description:
    a. Sheet membrane used to eliminate transmission of substrate cracks
2. Products and Manufacturers:
    a. Sheet Membranes:
        1) Crack Buster Pro manufactured by Custom Building Products, a Quikrete Company.
        2) Dalseal CIS manufactured by Dal-Tile.
        3) Fracture Ban manufactered by Laticrete.
        4) Mapeguard 2 manufactured by Mapei.
        5) Nobleseal CIS manufactured by The Noble Company.
        6) Tileguard manufactured by Polyguard Products, Inc.
    b. Liquid membrane with fiberglass mesh from one (1) of the following approved Products/Manufacturers in accordance with ANSI A118.12:
        1) Blue 92 manufactured by Laticrete International, Inc.
        2) Fracturefree manufactured by Custom Building Products.
        3) Mapelastic CI manufactured by Mapei.
        4) Hydro-rite FS manufactured by Texrite.

PART 3 - EXECUTION

3.1 REMOVAL OF EXISTING FLOOR COVERINGS

A. Refer to Section 02 41 00 - Demolition.

3.2 CONCRETE SLAB PREPARATION

A. Follow recommendations of testing agency.

B. Perform following operations in the order indicated:

1. Existing concrete slabs (on-grade and elevated) with existing floor coverings:

a. Visual observation of existing floor covering, for adhesion, water damage, alkaline deposits, and other defects.
b. Removal of existing floor covering in accordance with Section 02 41 00 - Demolition.

2. Existing concrete slabs with coatings or penetrating sealers/hardeners/dustproofers:
   a. Do not attempt to remove coating or penetrating material.
   b. Do not abrade surface.
3. Preliminary cleaning.
4. Moisture vapor emission tests; 3 tests in the first 1000 square feet and one test in each additional 1000 square feet, unless otherwise indicated or required by flooring manufacturer.
5. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
6. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
7. Specified remediation, if required.
8. Patching, smoothing, and leveling, as required.
9. Other preparation specified.
10. Adhesive bond and compatibility test.
11. Protection.

C. Remediations:
1. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct this condition before doing any other remediation; re-test after correction.
2. Excessive Moisture Emission or Relative Humidity: If an adhesive that is resistant to the level of moisture present is available and acceptable to flooring manufacturer, use that adhesive for installation of the flooring; if not, apply remedial floor coating or remedial sheet membrane over entire suspect floor area.
3. Excessive Alkalinity (pH): If remedial floor coating is necessary to address excessive moisture, no additional remediation is required; if not, if an adhesive that is resistant to the level present is available and acceptable to the flooring manufacturer, use that adhesive for installation of the flooring; otherwise, apply a skim coat of specified patching compound over entire suspect floor area.

3.3 PRELIMINARY CLEANING

A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.

B. Do not use solvents or other chemicals for cleaning.

3.4 PREPARATION

A. Refer to individual floor covering section(s) for additional requirements.

B. Comply with recommendations of testing agency.

C. Comply with requirements and recommendations of floor covering manufacturer.

D. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.

E. Do not fill expansion joints, isolation joints, or other moving joints.

3.5 ADHESIVE BOND AND COMPATIBILITY TESTING

A. Comply with requirements and recommendations of floor covering manufacturer.

3.6 APPLICATION OF REMEDIAL FLOOR COATING

A. Comply with requirements and recommendations of coating manufacturer.

3.7 INSTALLATION OF REMEDIAL FLOOR SHEET MEMBRANE

A. Install in accordance with sheet membrane manufacturer's instructions.

3.8 APPLICATION OF SPRAY-APPLIED ADHESIVE

A. Installation per each floor finish assembly product manufacturer's written instructions, and as follows:
   1. Spray-Applied Adhesive Method:
      a. Do not place finish-flooring product until adhesive applied to substrate is ready to receive it per adhesive manufacturer's instructions.
      b. Mark floor equivalent to manufacturer's recommended area for size of container used. Apply no more or less adhesive than what manufacturer recommends.
      c. Outline perimeter of the room with a 4-5 inch wide band of adhesive. Apply the adhesive from 8-12 inches (200-300 mm) above the substrate.
      d. Lay flooring finish material, adjust and reset until layout placement is certain.
      e. Following installation of finish flooring (typically within an hour after installing) roll entire floor area with a 75 to 100 lb roller to ensure proper bonding with instant shear strength.
   2. Close space to traffic for 2 hours before beginning installation, however, flooring is immediately available after rolling for all range of use.

3.9 PROTECTION

A. Cover prepared floors with building paper or other durable covering.

END OF SECTION 09 05 61

SECTION 09 21 16 - GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Gypsum board.
   2. Partition framing systems.
   3. Exterior gypsum board for ceilings and soffits.
   4. Tile backing panels.
   5. Ceiling suspension systems.
   6. Accessories necessary for a complete installation.

B. Related Sections:
   1. Section 06 10 00 - Rough Carpentry: Building blocking.
   2. Section 07 92 00 - Joint Sealants: Acoustical joint sealant.

1.3 REFERENCE STANDARDS

A. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2018.

B. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 2019.

C. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2019.

D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

E. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2017.

F. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2018.

G. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2020.

H. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2020.

I. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2018.

J. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2020.

K. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2019.

L. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2017.

M. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2018.

N. ASTM C1288 - Standard Specification for Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets; 2017.

O. ASTM C1325 - Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units; 2021.

P. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.

Q. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2019.

R. ASTM C1766 - Standard Specification for Factory-Laminated Gypsum Panel Products; 2015 Edition, February 1, 2015.

S. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.

T. ASTM D3274 - Standard Test Method for Evaluating Degree of Surface Disfigurement of Paint Films by Fungal or Algal Growth, or Soil and Dirt Accumulation; 2009 Edition, March 1, 2009

U. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).

V. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.

W. ASTM E413 - Classification for Rating Sound Insulation; 2022.

X. ASTM E488/E488M - Standard Test Methods for Strength of Anchors in Concrete Elements; 2022.

Y. ASTM E1190 - 2021 Edition, November 15, 2021 Standard Test Methods for Strength of Power-Actuated Fasteners Installed in Structural Members; 2021 Edition, November 15, 2021.

Z. ASTM F1267 - Standard Specification for Metal, Expanded, Steel; 2018 (Reapproved 2023).

1.4 PERFORMANCE REQUIREMENTS

A. Performance Requirements: Comply with manufacturer's load tables and the following design pressures and deflections:
   1. Stairs, Elevator Hoistways, and Vertical Shafts: 1/120 at 10 psf.
   2. Ground Floor Lobbies: 1/120 at 15 psf.
   3. Partitions Receiving Stone Cladding, Lath and Plaster, or Plaster Veneer: 1/360 at 15 psf.
   4. Partitions Receiving Monitors, Televisions, Heavy Audio/Visual Equipment: 1/360 at 15 psf.
   5. Typical Partitions: 1/240 at 5 psf.
   6. Other Partitions: 1/240 at 5 psf.
      a. Maximum Deflection:
         1) L/240 at 5 lbf per sq. ft.
         2) L/120 at 5 lbf per sq. ft.
         3) L/120 at 7.5 lbf per sq. ft.
         4) L/120 at 10 lbf per sq. ft.

B. Fire Resistance Rated Assemblies: For fire resistance rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.

C. STC Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

1.5 SUBMITTALS

A. Product Data: Submit For each type of drywall including calculations for loadings and stresses of exterior walls and specially fabricated framing based on manufacturer’s load tables.

B. Shop Drawings: Indicate locations, fabrication, and installation of control and expansion joints including plans, elevations, sections, details of components, and attachments to other units of work.

C. Samples:

1. Trim Accessories: Full size Sample in 12 inch long length for each trim accessory indicated.
2. Textured Finishes: 12 inch by 12 inch for each textured finish indicated and on same backing indicated for work.

D. Calculations: Submit calculations verifying steel partition stud minimum base metal thickness and depth compliance with Code and ASTM C645 for height, load, and deflection.

E. Exterior Product Approvals:
1. Manufacturer shall certify that product complies with and has been tested and approved in compliance with Florida Product Approval or Miami Dade NOA and applicable requirements.
2. Manufacturer shall certify that product complies with large [and small] missile impact criteria and has been tested and approved in compliance with Florida Product Approval or Miami Dade NOA and applicable requirements.

F. Evaluation Reports: ICC-ES reports for dimpled steel studs and runners and firestop tracks.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements:
1. Comply with applicable requirements of building code for interior finishes.
2. Fire Resistance Rated Assemblies: For fire resistance rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.

B. Single Source Responsibility:
1. Framing Members: Obtain steel framing members from single manufacturer.
2. Panel Products: Obtain each type of gypsum board and other panel products from single manufacturer.
3. Finishing Materials: To the extent possible, obtain finishing materials from same manufacturer supplying gypsum board products. When not possible, obtain materials from manufacturer acceptable to gypsum board manufacturer.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Comply with ASTM C840 for gypsum board manufacturer's written instructions, whichever are more stringent.
1. Do not install paper faced gypsum panels until installation areas are enclosed and conditioned.

B. Room Temperatures: Maintain minimum 40 degrees F. For adhesive attachment and finishing of gypsum board, maintain minimum 50 degrees F for 48 hours before application and continuously after until dry. Do not exceed 95 degrees F when using temporary heat sources.

C. Ventilation: Ventilate building spaces as required to dry joint treatment materials. Avoid drafts during hot, dry weather to prevent finishing materials from drying too rapidly.

D. Do not install panels that are wet, moisture damaged, and mold damaged.
1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
   1. Steel Studs and Tracks:
      a. CEMCO: www.cemcosteel.com.
      b. ClarkDietrich: www.clarkdietrich.com.
      c. Custom Stud, Inc.: www.customsteelcraft.com.
      d. MBA Building Supplies: www.mbastuds.com.
      e. MRI Steel Framing, LLC: www.mristeelframing.com.
      f. Phillips Manufacturing Co.: www.phillipsmfg.com.
      g. Steel Network, Inc. (The): www.steelnetwork.com.
      h. Telling Industries: www.tellingindustries.com.
   2. Ceiling Suspension System:
      a. Armstrong World Industries, Inc.: www.armstrongceilings.com.
      b. Rockfon: www.rockfon.com.
      c. USG Corporation: www.usg.com.
   3. Gypsum Board:
      a. Certainteed Corporation: www.certainteed.com.
      b. Georgia Pacific: www.gp.com.
      c. National Gypsum Company: www.nationalgypsum.com.
      d. USG Corporation: www.usg.com.
   4. Tile Backer Board:
      a. USG Corporation: www.usg.com.
   5. Glass Mat Gypsum Sheathing Board:
      a. USG Corporation: www.usg.com.
   6. Cementitious Board:
      a. Custom Building Products: www.custombuildingproducts.com.
      b. National Gypsum Company: www.nationalgypsum.com.
   7. Trim:
      a. Fry Reglet Corporation: www.fryreglet.com.
      b. Gordon, Inc.: www.gordon-inc.com.
      c. Pittcon Industries: www.pittconindustries.com.
      d. Schluter Systems: www.schluter.com.
   8. Extruded Partition Closure:
      a. Gordon, Inc.: www.gordon-inc.com.
   9. Security Mesh:
      a. ClarkDietrich: www.clarkdietrich.com.

B. Substitutions: Refer to section 01 25 00 - Substitution Procedures.
   1. Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution

2.2 MATERIALS

A. Framing Members: ASTM C754 for component sizes and conditions under specified maximum deflection and lateral loading conditions indicated.
   1. Steel Sheet Components: Comply with ASTM C645 requirements for metal.
   2. Protective Coating:
      a. Standard: ASTM A653/A653M, G40, hot dip galvanized.

B. Steel Framing Components: ASTM C754 for conditions indicated; hot dip galvanize complying with ASTM A653/A653M Z180.

1. Steel Studs and Runners: ASTM C645, 0.0179 inch minimum base metal thickness; depth indicated on Drawings.
2. Dimpled Steel Studs and Runners: ASTM C645, equivalent to minimum base metal thickness indicated on Drawings for depth indicated on Drawings.
3. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated. Minimum Base Metal Thickness: 0.0179 inch .
4. Cold-Rolled Channel Bridging: 0.0538 inch bare steel thickness, with minimum 1/2 inch wide flanges; depth indicated on Drawings.
5. Clip Angle: Not less than 1-1/2 inches by 1-1/2 inches , 0.068 inch thick, galvanized steel.
6. Hat Shaped, Rigid Furring Channels: ASTM C645; 0.0179 inch minimum base metal thickness; depth indicated on Drawings.
7. Resilient Furring Channels: 1/2 inch deep, steel sheet members designed to reduce sound transmission. Configuration: Asymmetrical or hat shaped.
8. Cold Rolled Furring Channels 0.0538 inch bare steel thickness, with minimum 1/2 inch wide flanges.
    a. Depth: As indicated on Drawings.
    b. Furring Brackets: Adjustable, corrugated edge type of steel sheet with minimum bare steel thickness of 0.0312 inch.
    c. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.0625 inch (1.59 mm) diameter wire, or double strand of 0.0475 inch diameter wire.
9. Z-Shaped Furring Channels: With slotted or non-slotted web, face flange of 1-1/4 inches , wall attachment flange of 7/8 inch , minimum bare metal thickness of 0.0179 inch , and depth required to fit insulation thickness indicated.
10. Auxiliary Framing Materials: Fasteners of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
11. Slip Type Head Joints: Where indicated, provide one of the following:
    a. Single Long Leg Runner System: ASTM C645 top runner with 2 inch deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging, located within 12 inches of the top of studs to provide lateral bracing.
    b. Double Runner System: ASTM C645 top runners, inside runner with 2 inch deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
    c. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs. Provide one of the following:
        1) Dietrich Metal Framing; SLP-TRK Slotted Deflection Track.
        2) Steel Network Inc. (The); VertiClip SLD or VertiTrack VTD Series.
        3) Superior Metal Trim; Superior Flex Track System (SFT).

C. Ceiling Suspension System:
1. Basis of Design:
    a. Drywall Grid Systems manufactured by Armstrong World Industries, Inc.
2. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.0625 inch diameter wire, or double strand of 0.0475 inch diameter wire.
3. Hanger Attachments to Concrete:
    a. Anchors: Post-installed, chemical anchor or post-installed, expansion anchor fabricated from corrosion resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E488/E488M by an independent testing agency.
    b. Powder Actuated Fasteners: Suitable for application indicated, fabricated from corrosion resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that

imposed by construction as determined by testing according to ASTM E1190 by an independent testing agency.

4. Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.162 inch (4.12 mm) diameter.
5. Carrying Channels: Cold rolled, commercial steel sheet with base metal thickness of 0.0538 inch and minimum 1/2 inch wide flanges. Depth indicated on Drawings.
6. Furring Channels (Furring Members):
    a. Cold Rolled Channels: 0.0538 inch (bare steel thickness, with minimum 1/2 inch wide flanges, 3/4 inch deep.
    b. Steel Studs: ASTM C645; minimum base metal thickness of 0.0312 inch; Depth as indicated on Drawings.
    c. Hat Shaped, Rigid Furring Channels: ASTM C645, 7/8 inch deep; Minimum base metal thickness of 0.0312 inch .
7. Resilient Furring Channels: 1/2 inch deep members designed to reduce sound transmission.
8. Grid Suspension System for Ceilings: ASTM C645, direct hung system composed of main beams and cross furring members that interlock.

D. Gypsum Board: ASTM C1396/C1396M, applicable to type of gypsum board indicated and whichever is more stringent.
1. Wall Board:
    a. Type: X.
    b. Thickness: 5/8 inch .
    c. Long Edges: Tapered and featured (rounded or beveled) for pre-filling.
2. Ceiling Board: Manufactured for sag resistance
    a. Type: X typical, C at fire-resistance-rated ceiling assemblies.
    b. Thickness: 1/2 inch.
    c. Long Edges: Tapered.
3. Moisture and Mold Resistant Type: Type X with moisture and mold resistant core and surfaces.
    a. Type: X.
    b. Thickness: 5/8 inch .
    c. Long Edges: Tapered.
4. Shaft Liner Type:
    a. Type: X.
    b. Thickness: 1 inch .
5. Fire-Resistant Core, Foil-Backed: ASTM C1396/C1396M
    a. Basis of Design: Gold Bond® Foil Back Gypsum Board manufactured by National Gypsum Company.
    b. Thickness: 5/8 inch.
    c. Core: Type X.
    d. Edges: Tapered.

E. Impact Resistant Gypsum Board: ASTM C1396/C1396M gypsum board, tested according to ASTM C1629/C1629M.
1. Core and Thickness: 5/8 inch , Type X.
2. Surface Abrasion: ASTM C1629/C1629M, meet or exceed Level 1 requirements.
3. Indentation: ASTM C1629/C1629M, meet or exceed Level 1 requirements.
4. Soft Body Impact: ASTM C1629/C1629M, meet or exceed Level 1 requirements.
5. Hard Body Impact: ASTM C1629/C1629M, meet or exceed Level 1 requirements according to test in Annex A1.
6. Long Edges: Tapered.
7. Mold Resistance: ASTM D3273, score of 10 as rated according to STM D3274.

F. Acoustically Enhanced Gypsum Board: ASTM C1766. Multilayer products constructed of two layers of gypsum boards sandwiching a viscoelastic sound-absorbing polymer core.

1. Manufacturers: Manufacturers listed whose products meet or exceed the specifications are approved for use on the Project. Other manufacturers must have a minimum of ten (10) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.
    a. CertainTeed Corp.; Silent FX QC.
    b. National Gypsum Company; Sound Break.
    c. PABCO; QuietRock.
    d. G-P/Temple Inland; Comfort Guard Sound.
2. Core: Regular Type.
3. Long Edges: Tapered.

G. Reinforced Gypsum Sheathing (Tile Backer Board): ASTM C1178/C1178M, standard edges. Cellulose fiber reinforced panels may be used in lieu of cementitious board.
1. Core and Thickness: 5/8 inch to match conditions, Type X.
2. Long Edge: Tapered.
3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

H. Glass Mat Gypsum Sheathing Board: ASTM C1177/C1177M, with fiberglass mat laminated to both sides and with standard edges.
1. Core: Type X.
2. Thickness: 5/8 inch.
3. Size: 48 inches by 96 inches.
4. Long Edges: Tapered

I. Cementitious Backer Units: ANSI A118.9 and ASTM C1288 or ASTM C1325.
1. Thickness: 1/2 inch and 5/8 inch to match conditions.
2. Long Edges: Standard.
3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

J. Exterior Trim: ASTM C1047, hot dip galvanized steel sheet, plastic, or rolled zinc.
1. Shapes:
    a. Cornerbead.
    b. LC Bead: J shaped; exposed long flange receives joint compound.
    c. Expansion (Control) Joint: One piece, rolled zinc with V shaped slot and removable strip covering slot opening.

K. Interior Trim: ASTM C1047; galvanized or aluminum coated steel sheet, rolled zinc, plastic, or paper faced galvanized steel sheet.
1. Shapes:
    a. Cornerbead.
    b. Bullnose bead.
    c. LC Bead: J shaped; exposed long flange receives joint compound.
    d. L Bead: L shaped; exposed long flange receives joint compound.
    e. U Bead: J shaped; exposed short flange does not receive joint compound.

L. Expansion (Control) Joint.
1. Manufacturers: Manufacturers listed whose products meet or exceed the specifications are approved for use on the Project. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.
    a. Fry Reglet Corp.
    b. Gordon, Inc.
    c. Pittcon Industries.

M. Continuous Corner Bead: Extruded Aluminum; continuous integral fin for surface contact with gypsum board; 7/8 inch wide, tapered to edge; punched with holes staggered to accept screw fastening. Prime with corrosion resistant primer.

1. Manufacturer: Specifications are based on products of manufacturers named as the Basis of Design. Manufacturers listed whose products meet or exceed the specifications are approved for use on the Project. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.
    a. Fry Reglet Corporation.
    b. Pittcon Industries.
    c. Schluter Systems.
2. Basis of Design Product: Pittcon Softforms SO-HSE-90

N. Joint Treatment: ASTM C475/C475M.
1. Joint Tape:
    a. Exterior Gypsum Soffit Board: Paper.
    b. Joint Compound for Exterior Applications, Glass Mat Gypsum Sheathing Board: Recommended by sheathing board manufacturer.
    c. Joint Tape, Interior Gypsum Board: Paper.
2. Joint Compound:
    a. Gypsum Board: Pre-Filling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting type taping compound.
        1) Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting type taping compound.
            (a) Use setting type compound for installing paper faced metal trim accessories.
        2) Fill Coat: For second coat, use setting type, sandable topping compound.
        3) Finish Coat: For third coat, use setting type, sandable topping compound.
        4) Skim Coat: For final coat of Level 5 finish, use setting type, sandable topping compound.
    b. Cementitious Units: Recommended by backer unit manufacturer.
    c. Tile Backing Panels: Recommended by backer unit manufacturer.
    d. Water Resistant Gypsum Backing Board: Use setting type taping compound and setting-type, sandable topping compound.
    e. Joint Compound, Glass Mat Sheathing Board: Recommended by sheathing board manufacturer.

O. Auxiliary Materials: Comply with referenced installation standards and manufacturer's written recommendations.
1. Steel Drill Screws: ASTM C1002, use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
2. Sound Attenuation Blankets: Refer to Section 09 81 00 - Acoustic Insulation.
3. Security Mesh:
    a. Material: Type II, Class 2 – Galvanized mesh complying with ASTM F1267.
    b. Gauge: 16 ga.
    c. Basis of Design Product: BM50 manufactured by ClarkDietrich.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow metal frames, cast in anchors, and structural framing, for compliance with requirements and other conditions affecting performance. Proceed with installation after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength. Furnish concrete inserts and other devices

indicated to other trades for installation in advance of time needed for coordination and construction.

3.3 INSTALLATION

A. Installation Standard: ASTM C754, except comply with framing sizes and spacing indicated.

B. Gypsum Board Assemblies: Comply with requirements in ASTM C840 applicable to framing installation.

C. Suspension System: Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
   1. Suspend hangers from building structure:
      a. Install hangers plumb and free from contact with insulation or objects within ceiling plenum that are not part of supporting structural or suspension system. Splay hangers where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
      b. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
         1) Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
      c. Do not attach hangers to steel roof deck.
      d. Do not attach hangers to permanent metal forms. Furnish cast in place hanger inserts that extend through forms.
      e. Do not attach hangers to rolled in hanger tabs of composite steel floor deck.
      f. Do not connect or suspend steel framing from ducts, pipes, or conduit.
   2. Fire Resistance Rated Assemblies: Wire tie furring channels to supports.
   3. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.
   4. Ceiling Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross furring members to each other and butt cut to fit into wall track.

D. Framing Assembly: Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
   1. Install studs so flanges within framing system point in same direction. Space studs in single layer application as indicated on drawings.
   2. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
      a. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
         1) Install two studs at each jamb, unless otherwise indicated.
         2) Install cripple studs at head adjacent to each jamb stud, with minimum 1/2 inch clearance from jamb stud to allow for installation of control joint in finished assembly.
         3) Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
      b. Other Framed Openings: Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
   3. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

E. Sound Insulation: Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.

F. Gypsum Panels: Comply with ASTM C840. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
   1. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
   2. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
   3. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
   4. Form control and expansion joints with space between edges of adjoining gypsum panels.
   5. Cover both faces of support framing with gypsum panels in concealed spaces, except in chases braced internally.
      a. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
      b. Fit gypsum panels around ducts, pipes, and conduits.
      c. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4 inch to 3/8 inch wide joints to install sealant.
   6. Isolate perimeter of gypsum board applied to non-load bearing partitions at structural abutments, except floors. Provide 1/4 inch to 1/2 inch wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
   7. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

G. Gypsum Board: Install interior gypsum board where indicated on drawings.
   1. Single Layer Application:
      a. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
      b. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated or required by fire resistance rated assembly, and minimize end joints. Stagger abutting end joints not less than one framing member in alternate courses of panels.
      c. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
   2. Multilayer Application:
      a. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
      b. On Z shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
      c. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

H. Backing Panels:
   1. Cementitious Backer Units: ANSI A108.11; install where indicated with 1/4 inch (6.4 mm) gap where panels abut other construction or penetrations. Where tile backing panels abut

other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

I. Exterior Gypsum Board Soffits: Apply panels perpendicular to supports, with end joints staggered and located over supports.
   1. Install with 1/4 inch open space where panels abut other construction or structural penetrations.
   2. Fasten with corrosion-resistant screws.

J. Trim Accessories: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Attach trim according to manufacturer's written instructions.
   1. Control Joints: Install control joints according to ASTM C840 (30 feet maximum), at each door and window jamb (unless noted otherwise), and in specific locations indicated on Drawings.
   2. Exterior Trim: Install in the following locations:
      a. Cornerbead: Use at outside corners.
      b. LC Bead: Use at exposed panel edges.
   3. Interior Trim: Install in the following locations:
      a. Cornerbead: Use at outside corners, unless otherwise indicated.
      b. Bullnose Bead: Use at outside corners.
      c. LC Bead: Use at exposed panel edges.
      d. L Bead: Use where indicated or necessary.
      e. U Bead: Use at exposed panel edges.

K. Gypsum Board Finishing: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
   1. Pre-fill open joints, rounded or beveled edges, and damaged surface areas.
   2. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
   3. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:
      a. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
      b. Level 2: Panels that are substrate for tile.
      c. Level 3: Where indicated on Drawings.
      d. Level 4: For surfaces receiving flat paints.
      e. Level 5: For surfaces receiving gloss or semi-gloss paint, subjected to severe lighting, or receiving wall covering.
   4. Glass Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.
   5. Glass Mat Faced Panels: Finish according to manufacturer's written instructions.

L. Installation Tolerances:
   1. Suspension System: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.
   2. Installation Tolerances, Suspension System: Install suspension systems level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

M. Fire-Resistance-Rated and Smoke Partitions Markings
   1. Each fire-resistance rated partition, smoke partition, or other wall requiring protected openings is to be marked as such as defined below.
      a. Location: Mark walls in accessible concealed floor, floor-ceiling, and attic spaces.
      b. Spacing: Markings shall be located within 15 feet of the end of each wall and at intervals not exceeding 30 feet measured horizontally along the wall or partition.

c. Lettering: Stenciled letters a minimum of 3 inches in height with a minimum 3/8 inch stroke in a color contrasting with the wall material (typically black) paint. Markings shall be one of the following, appropriate to the partition type, as indicated on plans.
   1) “SMOKE PARTITION – PROTECT ALL OPENINGS”.
   2) “#-HR FIRE BARRIER – PROTECT ALL OPENINGS” where #-HR is as indicated on the Drawings.
   3) “#-HR FIRE WALL – PROTECT ALL OPENINGS” where #-HR is as indicated on the Drawings.

3.4 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, and mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 21 16

SECTION 09 30 00 - TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Ceramic Tile.
   2. Porcelain Tile.

1.3 REFERENCE STANDARDS

A. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2017 (Reaffirmed 2022).

B. ANSI A108.1b - Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set, Modified Dry-Set, or Improved Modified Dry-Set Cement Mortar; 2023.

C. ANSI A108.1c - Contractor's Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set, Modified Dry-Set, or Improved Modified Dry-Set Cement Mortar; 2023.

D. ANSI A108.2 - American National Standard General Requirements: Materials, Environmental and Workmanship; 2019.

E. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesive or Water Cleanable Tile-Setting Epoxy Adhesive; 2023.

F. ANSI A108.5 - Setting of Ceramic Tile with Dry-Set Cement Mortar, Modified Dry-Set Cement Mortar, EGP (Exterior Glue Plywood) Modified Dry-Set Cement Mortar, or Improved Modified Dry-Set Cement Mortar; 2023.

G. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grout Epoxy; 2023.

H. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 1999 (Reaffirmed 2024).

I. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 2023.

J. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 2017 (Reaffirmed 2022).

K. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2018.

L. ANSI A108.12 - Installation of Ceramic Tile with EGP (Exterior Glue Plywood) Modified Dry-Set Mortar; 2023.

M. ANSI A108.13 - American National Standard for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2005 (Reaffirmed 2021).

N. ANSI A108.19 - American National Standard Specifications for Interior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs by the Thin-Bed Method Bonded with Modified Dry-Set Cement Mortar or Improved Modified Dry-Set Cement Mortar; 2020.

O. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 2019.

P. ANSI A118.10 - American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2014 (Reaffirmed 2019).

Q. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2014 (Reaffirmed 2019).

R. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2022.

S. ASTM C373 - Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products; 2018.

T. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2018.

U. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2024.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Meeting: Convene a pre-installation meeting one week before starting work of this section; require attendance by affected installers.

1.5 SUBMITTALS

A. Refer to Section 01 33 00 - Submittal Procedures for submittal procedures.

B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

C. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.

D. Samples: Mount tile and apply grout on two plywood panels, minimum 18 by 18 inches in size illustrating pattern, color variations, and grout joint size variations.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Master Grade Certificate: Submit for each type of tile, signed by the tile manufacturer and tile installer.

G. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Refer to Section 01 60 00 - Product Requirements for additional provisions.
   2. Extra Tile: 5 percent of each size, color, and surface finish combination.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.

1.7 MOCK-UP

A. Refer to Section 01 40 00 - Quality Requirements for general requirements for mock-up.

B. Construct tile mock-up where indicated on drawings, incorporating all components specified for the location.
   1. Minimum size of mock-up is indicated on drawings.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.9 FIELD CONDITIONS

A. Do not install solvent-based products in an unventilated environment.

B. Maintain ambient and substrate temperature above 50 degrees F and below 100 degrees F during installation and curing of setting materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
   1. Ceramic Tile:
      a. American Olean Tile Co., a division of Mohawk Industries, Inc.: www.americanolean.com.
      b. American Tile Company: www.americantilecompany.com.
      c. Dal-Tile Corp., a division of Mohawk Industries, Inc.: www.daltile.com.
      d. Interceramic, USA: www.interceramicusa.com.
      e. Marazzi Tile, Inc., a division of Mohawk Industries, Inc.: www.marazziusa.com.
      f. Roca Tile USA, a division of The Roca Tile Group: www.rocatileusa.com.
      g. United States Ceramic Tile Co., a division of The Roca Tile Group: www.rocatileusa.com.
   2. Porcelain Tile:
      a. American Olean Tile Co., a division of Mohawk Industries, Inc.: www.americanolean.com.
      b. American Tile Company: www.americantilecompany.com.
      c. Concept Surfaces: www.conceptsurfaces.com.
      d. Crossville, Inc.: www.crossvilleinc.com.
      e. Dal-Tile Corp., a division of Mohawk Industries, Inc.: www.daltile.com.
      f. Emser Tile: https://www.emser.com.
      g. Interceramic, USA: www.interceramicusa.com.
      h. Marazzi Tile, Inc., a division of Mohawk Industries, Inc.: www.marazziusa.com.
   3. Tile Setting and Grout Materials: Those manufactured by tile manufacturers named above or any of the following as approved by tile manufacturer for use with their tile and to suit application.
      a. ARDEX Engineered Cements: www.ardexamericas.com.
      b. Bostik Inc: www.bostik-us.com.
      c. Custom Building Products: www.custombuildingproducts.com.
      d. H.B. Fuller Construction Products, Inc: www.tecspecialty.com.
      e. LATICRETE International, Inc: www.laticrete.com.
      f. Mapei Americas: www.mapei.com.
      g. Merkrete, by Parex USA, Inc: www.merkrete.com.
      h. Texrite: www.texrite.com.

B. Substitutions: Refer to section 01 25 00 - Substitution Procedures.
   1. Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution.

2.2 TILE SCHEDULE

A. Porcelain Floor Tile PFT-01:
   1. Basis of Design:
      a. Products manufacturer by Dal-Tile Corp..
      b. Line: Delegate.
      c. Color: Dark Grey, D127.
      d. Finish: Manufacturer's Anti -Slip Coating.
   2. Material: Porcelain.
   3. Size: 12 inches by 24 inches.

B. Porcelain Wall Tile PWT-01, 02 & 03 :
   1. Basis of Design:
      a. Products manufacturer by Dal-Tile Corp.

b. Line: Fabric Art.
c. Color: Architect to select from Manufacturer's full range..
d. Finish: Architect to select from Manufacturer's full range.
2. Material: Porcelain.
3. Size: 2 inches by 2 inches.

C. Ceramic Wall Tile CWT-01 & 02:
1. Basis of Design:
a. Products manufacturer by Dal-Tile.
b. Line: Classic Color Wheel.
c. Color: Architect to select from Manufacturer's full range.
d. Finish: Matte.
2. Material: Ceramic.
3. Size: 6 inches by 6 inches.

D. Ceramic Cove Base CCB-01-02:
1. Basis of Design:
a. Products manufacturer by Dal-Tile Corp.
b. Line: Color Wheel Classic.
c. Color: Architect to select from Manufacturer's full range.
d. Finish: Architect to select from Manufacturer's full range.
2. Material: Ceramic.
3. Size: 4 inches x 6 inches.

2.3 CERAMIC TILE

A. Composition: ANSI A137.1 standard grade.

B. Size: As scheduled.

C. Thickness: Refer to Basis of Design product.

D. Shape: As scheduled.

E. Surface Finish: As scheduled.

F. Color(s): As scheduled.

G. Trim Units: Matching cove shapes in sizes coordinated with field tile.

2.4 PORCELAIN TILE

A. Composition: ANSI A137.1 standard grade.

B. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.

C. Size: As scheduled.

D. Thickness: Refer to Basis of Design product.

E. Surface Finish: As scheduled.

F. Color(s): As scheduled.

2.5 TRIM AND ACCESSORIES

A. Ceramic Trim (CCB-01 & 02: Matching cove base and cove ceramic shapes in sizes coordinated with field tile.
1. Applications:
a. Open Edges: Bullnose.
b. Inside Corners: Jointed.
c. Floor to Wall Joints: Cove base.
2. Manufacturers: Same as for tile.
3. Basis of Design: Color Wheel as manufactured by Dal-Tile Corp.
4. Size: 4 inches by 6 inches.
5. Finish: Matte.

6. Color: Architect to select from Manufacturer's full range.

B. Metal Trim: Refer to Section 05 75 00 - Decorative Formed Metal.

C. Thresholds: 2 inches wide by full width of wall or frame opening; beveled edge on both long edges; without holes, cracks, or open seams.
   1. Thickness: 1/2 inch.

2.6 SETTING MATERIALS

A. Provide setting and grout materials from same manufacturer.

2.7 GROUTS

A. Provide setting and grout materials from same manufacturer.

2.8 MAINTENANCE MATERIALS

A. Tile Sealant: Gunnable, silicone, siliconized acrylic, or urethane sealant; moisture and mildew resistant type.
   1. Applications: Between tile and plumbing fixtures.

B. Grout Sealer: Liquid-applied, moisture and stain protection for existing or new Portland cement grout.
   1. Composition: Water-based colorless silicone.

C. Tile Sealer: Stain protection for ceramic tile and natural stone tile.

2.9 ACCESSORY MATERIALS

A. Concrete Floor Slab Crack Isolation Membrane: Material complying with ANSI A118.12; not intended as waterproofing.
   1. Crack Resistance: No failure at 1/8 inch gap, minimum.

B. Waterproofing Membrane at Floors: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.

C. Backer Board: Cementitious type complying with ANSI A118.9; high density, glass fiber reinforced, 7/16 inch thick; 2 inch wide, alkali-resistant, coated glass fiber mesh tape for joints and corners.
   1. Basis of Design Product(s):

D. Backer Board: Coated glass mat type complying with ASTM C1178/C1178M; inorganic fiberglass mat on both surfaces and integral acrylic coating vapor retarder.
   1. Standard Type: Thickness 1/2 inch.
   2. Fire Resistant Type: Type X core, thickness 5/8 inch.
   3. Basis of Design Product(s):

E. Mesh Tape: 2 inch wide self-adhesive fiberglass mesh tape.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that subfloor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.

C. Verify that subfloor surfaces are dust free and free of substances that could impair bonding of setting materials to subfloor surfaces.

D. Cementitious Subfloor Surfaces: Verify that substrates are ready for tiling installation by testing for moisture and alkalinity (pH).
   1. Obtain instructions if test results are not within limits recommended by tiling material manufacturer and setting material manufacturer.

3.2 PREPARATION

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.

E. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

3.3 INSTALLATION - GENERAL

A. Install tile, thresholds, and stair treads and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.19, manufacturer's instructions, and TCNA (HB) recommendations.

B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

E. Form internal angles square and external angles bullnosed.

F. Install non-ceramic trim in accordance with manufacturer's instructions.

G. Install thresholds where indicated.

H. Sound tile after setting. Replace hollow sounding units.

I. Keep control and expansion joints free of mortar, grout, and adhesive.

J. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

K. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.

L. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.4 INSTALLATION - WALL TILE

A. On exterior walls install in accordance with TCNA (HB) Method W244, thin-set over cementitious backer units, with waterproofing membrane.

B. Over cementitious backer units on studs, install in accordance with TCNA (HB) Method W244, using membrane at toilet rooms.

C. Over cementitious backer units install in accordance with TCNA (HB) Method W223, organic adhesive.

D. Over coated glass mat backer board on studs, install in accordance with TCNA (HB) Method W245.

E. Over gypsum wallboard on wood or metal studs install in accordance with TCNA (HB) Method W243, thin-set with dry-set or latex-Portland cement bond coat, unless otherwise indicated.

F. Over interior concrete and masonry install in accordance with TCNA (HB) Method W202, thin-set with dry-set or latex-Portland cement bond coat.

G. Over wood studs without backer install in accordance with TCNA (HB) Method W231, mortar bed, with membrane where indicated.

H. Over metal studs without backer install in accordance with TCNA (HB) Method W241, mortar bed, with membrane where indicated.

3.5 CLEANING

A. Clean tile and grout surfaces.

3.6 PROTECTION

A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION 09 30 00

SECTION 09 51 00 - ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:
   1. Suspended metal grid ceiling system.
   2. Suspended plastic grid ceiling system.
   3. Acoustical units.
   4. Supplementary acoustical insulation above ceiling.

1.3 REFERENCE STANDARDS

A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

D. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

E. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2022.

F. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.

G. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2022.

H. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2019.

I. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2023.

J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

K. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.

L. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2024a.

M. ASTM E795 - Standard Practices for Mounting Test Specimens During Sound Absorption Tests; 2016.

N. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2023.

O. ASTM E1414/E1414M - Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum; 2021a.

P. CHPS (HPPD) - High Performance Products Database; Current Edition.

Q. ISO 14644-1 - Cleanrooms and associated controlled environments - Part 1: Classification of air cleanliness by particle concentration; 2015.

R. ITS (DIR) - Directory of Listed Products; Current Edition.

S. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2024.

T. UL (FRD) - Fire Resistance Directory; Current Edition.

U. UL (GGG) - GREENGUARD Gold Certified Products; Current Edition.

V. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Do not install acoustical units until after interior wet work is dry.

1.5 SUBMITTALS

A. Refer to Section 01 33 00 - Submittal Procedures, for submittal procedures.

B. Shop Drawings: Indicate grid layout and related dimensioning.

C. Product Data: Provide data on suspension system components and acoustical units.

D. Evaluation Service Reports: Show compliance with specified requirements.

E. Samples: Submit two samples 6 by 6 inch in size illustrating material and finish of acoustical units, including edge.

F. Samples: Submit two samples each, 6 inches long, of suspension system main runner, cross runner, and perimeter molding.

G. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

H. Designer's Qualification Statement.

I. Manufacturer's Qualification Statement.

J. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Refer to Section 01 60 00 - Product Requirements, for additional provisions.
   2. Extra Acoustical Units: Quantity equal to 5 percent of each type installed, to a minium of one box of each.

1.6 QUALITY ASSURANCE

A. Designer Qualifications for Seismic Design: Perform under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed at the State in which the Project is located.

B. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.7 FIELD CONDITIONS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 55 percent prior to, during, and after acoustical unit installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
   1. Acoustic Panels:
      a. Armstrong World Industries, Inc.: www.armstrongceilings.com.

b. Acoustic Ceiling Products, Inc.: www.acpideas.com.
c. Acoustics First Corporation: www.acousticsfirst.com.
d. CertainTeed Corporation: www.certainteed.com.
e. Hunter Douglas Architectural: www.hunterdouglasarchitectural.com.
f. Nelson Industrial, Inc: www.nelsonii.com/arch.
g. TECHLITE: www.techlite.com.
h. USG Corporation: www.usg.com/ceilings.

B. Substitutions: Refer to section 01 25 00 - Substitution Procedures.
1. Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution

2.2 PANELS

A. General Requirements: ASTM E1264, Class A.
1. VOC Content: Certified as Low Emission by one of the following:
a. Product listing in UL (GGG).
b. Product listing in CHPS (HPPD).

B. Acoustical Ceiling Panels (ACT-01): Painted mineral fiber, with the following characteristics:
1. Basis of Design:
a. Fine Fissured manufactured by Armstrong World Industries.
2. Classification: ASTM E1264 Type III.
a. Form: 1, nodular.
b. Pattern: "A" - perforated, regularly spaced large holes.
3. Size: 24 by 24 inches.
4. Thickness: 5/8 inch.
5. Minimum NRC Range: 0.55, determined in accordance with ASTM E1264.
6. Articulation Class (AC): N/A.
7. Ceiling Attenuation Class (CAC): 35, determined in accordance with ASTM E1264.
8. Panel Edge: Square.
9. Color: As indicated on Drawings.
10. Suspension System: As indicated on Drawings.

2.3 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Hanger Wire: 12 gauge, 0.08 inch galvanized steel wire.

C. Hold-Down Clips: Manufacturer's standard clips to suit application.

D. Seismic Clips: Manufacturer's standard clips for seismic conditions and to suit application.

E. Wood Veneer Panel Safety Clips: Galvanized 1-9/16 by 5-1/2 inch bent sheet metal clips screw anchored to back of adjacent panels and spanning over top of suspended tee grid.
1. Wire Ties: No. 12 galvanized wire.

F. Wood Veneer Perimeter Trim: Field cut wood veneer panels to match acoustic ceiling panels.
1. Support: Aluminum L angle, 1/8 inch thick.

G. Perimeter Moldings: Same metal and finish as grid.
1. Size: As required for installation conditions and specified Seismic Design Category.
2. Angle Molding: L-shaped, for mounting at same elevation as face of grid.
3. Shadow Molding: Shaped to create a perimeter reveal.
a. Basis of Design:
4. Channel Molding: U-shaped, for hold-down type installations.
5. Gaskets For Perimeter Moldings: Closed-cell foam, factory-applied to molding.

6. Acoustical Sealant For Perimeter Moldings: Non-hardening, non-skinning, for use in conjunction with suspended ceiling system.

H. Metal Edge Trim for "Cloud" Suspension Systems: Steel or extruded aluminum; provide attachment clips, splice plates, and preformed corner pieces for complete trim system.
   1. Trim Height: As indicated on Drawings.
   2. Finish: Baked enamel.
   3. Color: As indicated on Drawings.

I. Ceiling Pockets with Prewired Raceway: UL 325 listed, extruded aluminum shade pocket with removable closure panel and acoustical unit support, for recess mounting in suspended acoustical or drywall ceilings; size and configuration as indicated on drawings.
   1. Basis of Design:
   2. Designed to accommodate installation of motor control and wiring accessories within pocket.

J. Acoustical Insulation: Refer to Section 07 21 00 - Thermal Insulation.

K. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

3.2 PREPARATION

A. Install after major above-ceiling work is complete.

B. Coordinate the location of hangers with other work.

C. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.

3.3 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.

B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

C. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size.

D. Locate system on room axis according to reflected plan.

E. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
   1. Install in bed of acoustical sealant.
   2. Use longest practical lengths.
   3. Overlap and rivet corners.

F. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

G. Seismic Suspension System, Seismic Design Category C: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Maintain a 3/8 inch clearance between grid ends and wall.

H. Seismic Suspension System, Seismic Design Categories D, E, F: Hang suspension system with grid ends attached to the perimeter molding on two adjacent walls; on opposite walls, maintain a 3/4 inch clearance between grid ends and wall.

I. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

J. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

K. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

L. Do not eccentrically load system or induce rotation of runners.

M. Form expansion joints as detailed. Form to accommodate plus or minus 1 inch movement. Maintain visual closure.

N. Install light fixture boxes constructed of gypsum board above light fixtures in accordance with fire rated assembly requirements and light fixture ventilation requirements.

3.4 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Lay directional patterned units with pattern parallel to longest room axis.

D. Fit border trim neatly against abutting surfaces.

E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

F. Cutting Acoustical Units:
   1. Cut to fit irregular grid and perimeter edge trim.
   2. Make field cut edges of same profile as factory edges.
   3. Double cut and field paint exposed reveal edges.

G. Where round obstructions occur, provide preformed closures to match perimeter molding.

H. Lay acoustical insulation for a distance of 48 inches either side of acoustical partitions as indicated.

I. Install hold-down clips on each panel to retain panels tight to grid system; comply with fire rating requirements.

J. Install hold-down clips on panels within 8 ft of an exterior door.

K. Install plastic lay-in panels at following minimum distance from conventional light sources:
   1. Halogen, 60 Watt: 14 inches minimum.
   2. Incandescent, 120 Watt: 15 inches minimum.
   3. Quartz Halogen, 500 Watt: 23 inches minimum.

L. Install safety clips on wood veneer panels 2 inches from outside edge of panel and at 24 inches on center.
   1. Use wire ties to attach safety clips.

M. Install wood veneer trim using aluminum L angle to attach to suspended grid system as required for application.

3.5 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION 09 51 00

SECTION 09 65 00 - RESILIENT FLOORING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Resilient tile flooring
   2. Installation accessories.

B. Related Sections:
   1. Division 26: Electrical floor cover plates for installation of resilient flooring specified in this section.

1.3 REFERENCE STANDARDS

A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2019a, with Editorial Revision (2020).

B. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile; 2004 (Reapproved 2018).

C. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2023.

1.4 SUBMITTALS

A. Refer to Section 01 33 00 - Submittal Procedures for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

C. Verification Samples: Submit two samples, 6 by 6 inch in size illustrating color and pattern for each resilient flooring product specified.

D. Sustainable Design Submittal: Submit VOC content documentation for flooring and adhesives.

E. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of subfloor is acceptable.

F. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Refer to Section 01 78 23 - Operation and Maintenance Data for additional provisions.
   2. Extra Flooring Material: Provide extra flooring material equal to 1 percent of each type and color of installed flooring, minimum of 10 square feet.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing specified flooring with minimum three years documented experience.

B. Installer Qualifications: Company specializing in installing specified flooring with minimum three years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.

B. Store all materials off of the floor in an acclimatized, weather-tight space.

C. Maintain temperature in storage area between 55 degrees F and 90 degrees F.

D. Do not double stack pallets.

1.7 FIELD CONDITIONS

A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work

B. Substitutions: Refer to section 01 25 00 - Substitution Procedures.
   1. Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution.

2.2 GENERAL REQUIREMENTS

A. Unless noted otherwise, all Resilient Flooring shall comply with the following:
   1. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.

2.3 RESILIENT TILE FLOORING

A. General Requirements
   1. Size(s): As indicated on Drawings.

B. Vinyl Composition Tile- VCT - 01, 02, 03,04 & 05: Homogeneous, with color extending throughout thickness.
   1. Manufacturers: Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
      a. Armstrong Flooring: www.armstrongflooring.com/#sle.
      b. Johnsonite, a Tarkett Company: www.johnsonite.com/#sle.
   2. Basis of Design:
      a. Manufacturer: Armstrong.
      b. Collection: Vinyl Composition Tile.
      c. Color: Architect to select from Manufacturer's full range of colors.
   3. Minimum Requirements: Comply with ASTM F1066, of Class corresponding to type specified.
   4. Thickness: 0.125 inch.

2.4 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.

B. Adhesive for Vinyl and Rubber Flooring:
   1. Manufacturers: Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
      a. H.B. Fuller Construction Products, Inc: www.tecspecialty.com.
      b. Loba-Wakol, LLC: www.loba-wakol.com.
      c. Stauf USA, LLC: www.staufusa.com.

C. Moldings, Transition and Edge Strips:
   1. Metal Moldings, Transition and Edge Strips: Refer to Section 05 75 00 - Decorative Formed Metal.
   2. Resilient Moldings, Transition and Edge Strips: Refer to Section 09 65 13 - Resilient Base and Accessories.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.

B. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.

B. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.

C. Prohibit traffic until filler is fully cured.

D. Clean substrate.

E. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.

3.3 INSTALLATION - GENERAL

A. Starting installation constitutes acceptance of subfloor conditions.

B. Install in accordance with manufacturer's written instructions.

C. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.

D. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.

E. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

F. Install flooring in recessed floor access covers, maintaining floor pattern.

3.4 INSTALLATION - TILE FLOORING

A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.

3.5 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean in accordance with manufacturer's written instructions.

3.6 PROTECTION

A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION 09 65 00

SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes
   1. Resilient base, adhesive attached, in locations shown on drawings.
   2. Resilient subfloor transitions.

1.3 REFERENCE STANDARDS

A. ASTM F1861 - Standard Specification for Resilient Wall Base; 2021.

1.4 SUBMITTALS

A. Product Data:
   1. Manufacturer’s specifications and other data needed to demonstrate compliance with specified requirements.
   2. Manufacturer’s installation instructions.

B. Samples:
   1. Actual samples or color charts showing manufacturer’s full range of colors, for Architect’s selection (if selections are not already scheduled or otherwise indicated on the drawings).
   2. Actual 12-inch-long piece of base material in each color selected for approval.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers listed, whose product meets or exceeds the specifications are approved for use on the Project with Architect’s approval. Other manufacturers must have a minimum of five (5) years’ experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.
   1. Burke Flooring.
   2. Flexco.
   3. Johnsonite.
   4. Mannington.
   5. Nora Rubber Products.
   6. Roppe Corp.
   7. Tarkett.

2.2 MATERIALS

A. Standard Rubber Base (typical except where extended toe or other type of base is specifically indicated on drawings, e.g., at athletic flooring or elsewhere) (RB-1 & 2):
   1. Quality Standard: ASTM F1861.
   2. Material: Rubber, vulcanized, Type TS, Group I, Styles A and B. Vinyl base and Type TP are not acceptable.
   3. Manufacturing Method: Group I (solid, homogeneous)
   4. Style: Topset cove; rolls of greatest length available, cut to length required to minimize joints.
   5. Minimum Thickness: Full 1/8 inch.
   6. Color(s): As scheduled or otherwise indicated on the drawings, or if not so indicated, as selected by Architect.
   7. Height: 4 inches, unless indicated otherwise
   8. Corners: Job-Formed.

9. Basis of Design: Products as manufactured by Flexco and Johnsonite.

B. Joining and Edge Finish Moldings (TR-#):
   1. Usage: For use at flooring terminations with other flooring
   2. Type: Tapered or bullnose edge, as required to provide juncture at edge of adjacent floor surfaces
   3. Size: One (1) inch wide by 1/8 inch thick or as applicable to the type of flooring and condition
   4. Material: Rubber or vinyl as recommended by manufacturer to suit application
   5. Color(s): Architect to select from Manufacturer's full range of colors.
   6. Manufacturers: Burke Flooring, Flexco, Johnsonite, Roppe, Tarkett, or Architectt approved equal.
   7. Transition Type:
      a. Snap Down “T” (TR-1): Snap-in “T” molding joining 1/4 or 5/16 inch material on each side.
         1) Basis of Design: “Transitional Moldings 930” as manufactured by Mannington.
         2) Accessories: 970, 980, or 990 track.
      b. Tile Carpet Joiner (TR-2): One-piece molding joining 1/4-inch carpet to 1/4 inch tile
         1) Basis of Design: “Transitional Moldings 150” as manufactured by Mannington.
      c. Underslung Reducer (TR-3): Binder bar edging for 1/16 inch to 1/8-inch resilient floors with dry back.
         1) Basis of Design: “Transitional Moldings 735” as manufactured by Mannington.

C. Stair Treads (STR-01).
   1. Usage: For use at interior stairs, as indicated on Drawings.
   2. Type: Stair treads with integrated riser.
   3. Thickness: 1/8 inch.
   4. Size: Largest sizes available as required for installation.
   5. Material: Rubber or vinyl as recommended by manufacturer to suit application.
   6. Color(s): As selected by architect from manufacturer’s full line.
   7. Manufacturers: Johnsonite or Architect approved equal.
   8. Basis of Design: Rubber Stair Tread with integrated riser.

D. Resilient Nosing (RN-1) (RN-#):
   1. Usage: For use at interior stairs, as indicated on Drawings.
   2. Type: Linear Stair Nosing.
   3. Thickness: 1/8 inch at tread.
   4. Material: Rubber or vinyl as recommended by manufacturer to suit application.
   5. Color(s): As selected by Architect.
   6. Manufacturers: Burke Flooring, Flexco, Johnsonite, Mannington Commercial, Mohawk, Roppe, Tarkett, or Architect approved equal.
   7. Basis of Design: Model 565 “Double Undercut Carpet Stair” as manufactured by Mannington Commercial.

E. Resilient Subfloor Transition (RST):
   1. Usage: Subfloor Transition System.
   2. Thickness: Varies, cut to length.
   3. Material: Rubber or vinyl as recommended by manufacturer to suit application.
   4. Basis of Design: “The Equalizer Transition” as manufactured by Mannington Commercial.

F. Adhesive: Rubber-based type; same brand as base or as recommended and approved by base manufacturer to suit application.

G. Other Materials: Provide other materials, not specifically described but required for a complete and proper installation.

2.3 EXTRA STOCK

A. Deliver to Owner:

1. percent, or one (1) unopened carton of each color, type and size of base selected, whichever is greater.
2. One (1) gallon container of each type adhesive used for base.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which Work of this Section will be performed. Report unsatisfactory conditions to Architect in writing. Do not proceed until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Prepare substrates to receive base as recommended by base manufacturer.

B. Verify substrates are smooth and ready to receive resilient base. Grind high spots and fill low spots with latex cementitious filler as required.

C. Starting Work indicates acceptance of existing conditions.

3.3 INSTALLATION

A. General:
   1. Install materials only after finishing operations, including painting, have been completed and after permanent heating and cooling system is operating.
   2. Verify that moisture content of concrete slabs, building air temperature, and relative humidity are within the limits recommended by the manufacturers of the materials used.

B. Installing Base:
   1. Install base where shown on the Drawings in accordance with manufacturer’s instructions.
   2. Use factory-preformed exterior corners, and factory preformed or job-mitered interior corners, as indicated on the drawings or directed by Architect.

3.4 CLEANING AND PROTECTING

A. Remove excess adhesive and other blemishes from exposed surfaces, using neutral cleaner recommended by the manufacturer of the resilient materials.

END OF SECTION 09 65 13

SECTION 09 65 66 - RESILIENT ATHLETIC FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Rubber sheet flooring, adhesively installed.
   2. Vinyl sheet flooring, adhesively installed.
   3. Interlocking, loose-laid rubber tile.

1.3 REFERENCE STANDARDS

A. DIN EN 14904 - Surfaces for Sports Areas – Indoor Surfaces for Multi-Sports Use – Specification; 2006.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers; review preparation and installation procedures and coordination and scheduling necessary for related work.

1.5 SUBMITTALS

A. Refer to Section 01 33 00 - Submittal Procedures for submittal procedures.

B. Product Data: Manufacturer's printed data sheets for products specified.

C. Shop Drawings: Fabrication and installation details, and layout, colors, and widths of game lines and equipment locations.

D. Selection Samples: Manufacturer's color charts for flooring materials specified and game line paints, indicating full range of colors and textures available.

E. Verification Samples: Actual flooring material specified, not less than 12 inch square, mounted on solid backing.
   1. Include samples of game lines, illustrating colors selected.

F. Test Reports: Submit test reports showing compliance with DIN EN 14904.

G. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.

H. Sustainable Design Submittal: Submit VOC content documentation for flooring and adhesives.

I. Manufacturer's Instructions: Indicate standard and special installation procedures.

J. Installer's qualification statement.

K. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Refer to Section 01 60 00 - Product Requirements for additional provisions.
   2. Extra Flooring Material: 10 square yards matching installed flooring.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to project site in unopened containers clearly labeled with manufacturer's name and identification of contents.

B. Store materials in dry and clean location until needed for installation. During installation, handle in a manner that will prevent marring and soiling of finished surfaces.

1.8 FIELD CONDITIONS

A. Maintain temperature in spaces to receive adhesively installed resilient flooring within range of 70 to 95 degrees F for not less than 48 hours before the beginning of installation and for not less than 48 hours after installation has been completed. Subsequently, do not allow temperature in installed spaces to drop below 50 degrees F or to go above 100 degrees F.

PART 2 - PRODUCTS

2.1 PREFORMED ATHLETIC FLOORING

A. Acceptable Manufacturers:
   1. Specifications are based on the products identified as Basis of Design. Manufacturers listed whose products meet or exceed the specifications are approved for use in the Work. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.
      a. Burke Flooring: www.burkeflooring.com/#sle.
      b. Dinoflex Group: www.dinoflex.com/#sle.
      c. Grid: www.builtbygrid.com/#sle.
      d. LG Hausys America, Inc; : www.lghausysusa.com/#sle.
      e. No Fault Sport Group: www.nofault.com/#sle.
      f. Pawling Corporation: www.pawling.com/#sle.
      g. Robbins Sports Surfaces: www.robbinsfloor.com/#sle.
      h. Tarkett Sports: www.tarkettsportsindoor.com/#sle.
      i. Ultimate RB: www.ultimaterb.com/#sle.
      j. U.S. Rubber Recycling, Inc: www.usrubber.com/#sle.
      k. Harlequin Floors.
   2. Substitutions: Refer to section 01 25 00 - Substitution Procedures.

B. Vinyl Sheet Flooring (VF-01):
   1. Basis of Design: Standast Multi-Purpose as manufactured by Harlequin Floors.
   2. System: Harlequin Liberty LatchLoc.
   3. Type: Homogeneous PVC with a fire resistant performance surface.
   4. Backing: None.
   5. System Thickness: 1-5/8 inch nominal.
   6. Sheet Width: Minimum 48 inches.
   7. Sheet Lengths: As necessary to minimize transverse seams.
   8. Testing Standards: DIN 18032-2
   9. Average Shock Absorption: 67%.
   10. Point Load: > 807 lb.
   11. Rolling Load: >1500 N.
   12. Bertical Deformation: 4.1 mm.
   13. Area Deflection: 12.8%.
   14. Fire Rating: Bfls 1 to EN 13501.
   15. Seaming Method: Welding with heat or chemical.
   16. Surface Texture: Smooth.
   17. Color: To be selected by Architect from manufacturer's standard range.

C. Rubber Tile Flooring: Recycled vulcanized rubber and colored granules.
   1. Thickness: Minimum 12 mm.
   2. Tile Edge/Installation: Interlocking shape, loose-laid installation.
   3. Surface Texture: Smooth.
   4. Color: To be selected by Architect from manufacturer's standard range.
   5. Products:
      a. Roppe Corporation; Recoil: www.roppe.com/#sle.

2.2 ACCESSORIES

A. Flooring Adhesive: Waterproof; types recommended by flooring manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for conditions detrimental to installation of athletic flooring. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of athletic flooring to substrate.

3.2 PREPARATION

A. Remove coatings that are incompatible with flooring adhesives, using methods recommended by flooring manufacturer.

B. Broom clean areas to receive athletic flooring immediately before beginning installation.

3.3 INSTALLATION

A. Starting installation constitutes acceptance of subfloor conditions.

B. Install in accordance with manufacturer's written instructions.

C. Resilient Sheet Flooring:

1. Unroll flooring and allow to relax before beginning installation.
2. Mix adhesive thoroughly and apply to substrate with notched trowel. Roll flooring into fresh adhesive, overlapping end seams and double cutting, butting factory edges and compression fitting.
3. Roll entire flooring surface with steel roller to assure adhesion to substrate and eliminate air bubbles.
4. Immediately remove any adhesive from flooring surface, using chemical recommended by flooring manufacturer.
5. Weld seams using techniques and equipment recommended by manufacturer.
6. Lay out game lines using tape and taping machine approved by flooring manufacturer. Apply game line paint with roller, and allow to dry before removing tape.
7. Apply transparent top coat over flooring if recommended by manufacturer, to achieve a uniform finished appearance.

D. Rubber Tile Flooring:

3.4 CLEANING

A. Clean flooring using methods recommended by manufacturer.

3.5 PROTECTION

A. Protect finished athletic flooring from construction traffic to ensure that it is without damage upon Date of Substantial Completion.

END OF SECTION 09 65 66

SECTION 09 81 00 - ACOUSTIC INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Fiberglass batt acoustical insulation.
   2. Sprayed cellulose fiber acoustical insulation.

B. Related Sections:
   1. Section 09 90 00 - Painting and Coating: Painting of spray-applied acoustic insulation.

1.3 REFERENCE STANDARDS

A. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2022.

B. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013 (Reapproved 2019).

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

D. ASTM E605/E605M - Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members; 2019 (Reapproved 2023).

E. ASTM E736/E736M - Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members; 2019 (Reapproved 2023).

F. ASTM E759/E759M - Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members; 1992 (Reapproved 2023).

1.4 SYSTEMS DESCRIPTION

A. Contractor must use a total system, encompassing equipment, fiber and adhesive as supplied and tested by the manufacturer. No substitution.

B. Fibers supplied under this Section shall have each bag coded with the date and lot number of manufactures and retained samples shall be kept by the manufacturer for not less than 1 year.

C. Contractor must be licensed and trained by the manufacturer.

1.5 SUBMITTALS

A. Product Data:
   1. Manufacturer’s specifications and other data needed to prove compliance with specified requirements.
   2. Manufacturer’s installation instructions.

B. Certification:
   1. Manufacturer's certificate that the product meets or exceeds specified requirements.
   2. Manufacturer's written certification that product contains no asbestos, and that sprayed-cellulose fiber acoustical insulation contains no fiberglass or other man made mineral fibers.

1.6 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturers.
   2. Suppliers.
   3. Installers/Applicators.

1.7 MOCK-UPS

A. Spray-Applied Insulation: A representative surface of not less than 100 square feet shall be sprayed and approved by the Architect prior to proceeding with finished work.

1.8 DELIVERY, STORAGE AND HANDLING

A. Materials shall be delivered in original, unopened containers bearing name of manufacturer, product identification and reference to U.L. testing.

B. Store materials off ground, under cover and away from damp surfaces and keep material dry at all times.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
   1. Batt Insulation:
      a. CertainTeed, LLC: www.certainteed.com.
      b. Johns Manville, a Berkshire Hathaway Company: www.jm.com.
      c. Knauf: knauf.com.
      d. Owens Corning: www.owenscorning.com.
   2. Spray-Applied Acoustic Insulation:
      a. International Cellulose Corporation: www.spray-on.com.
      b. Monoglass Incorporated: www.monoglass.com.

B. Substitutions: Refer to section 01 25 00 - Substitution Procedures.
   1. Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution.

2.2 MATERIALS

A. Acoustic Glass Batt Insulation for Use over Open Ceiling Panels:
   1. Basis of Design: Select Sound Black Acoustic Blanket manufactured by Owens-Corning.
   2. Type: ASTM C553, Types I and II.
   3. Surface Burning Characteristics per ASTM E84:
      a. Flame Spread: 25 or less.
      b. Smoke Developed: 50 or less.
   4. Acoustical Performance:
      a. ASTM C423; Mounting Type A: Material placed against solid backing.
   5. Thickness (minimum):
      a. 1 inches (NRC 0.75).

B. Spray-Applied Acoustic Insulation:
   1. Color: Black, unless noted otherwise.
   2. Field-tested bond strength report per ASTM E736/E736M: Tested at over 5 years / Not less than 400 psf / Not less than 600 times its weight at one (1) inch
   3. Fire Resistance per ASTM E84: Tested at a minimum of five (5) inch thickness, Class I
      a. Flame Spread: Not To Exceed Five (5).
      b. Smoke Development: Not To Exceed Five (5).
   4. Sprayed insulation shall meet appropriate Building Code Requirements.
   5. Thickness: 1-1/2 inch minimum typical. Thickness shall be determined in accordance with ASTM E605/E605M field test procedure.
   6. Bond Deflection per ASTM E759/E759M: 6 inch deflection in 10 foot span - no spalling or delamination.
   7. Cohesive Strength at time of application per Method WS-2000: >700 Grams.

8. Basis of Design: “K-13 Spray-On-Systems” manufactured by International Cellulose Corporation.

PART 3 EXECUTION

3.1 INSPECTION

A. Examine all surfaces and report all unsatisfactory conditions in writing to Architect. The work shall not proceed until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Provide masking, drop cloths or other satisfactory coverings for all materials/surfaces, which are not to receive insulation to prevent damage from over-spray.

B. Surfaces to receive spray insulation shall be inspected prior to application to determine if priming/sealing is required to ensure bonding and/or to prevent discoloration caused by migratory stains. Prime accordingly.

C. Work shall be coordinated with other trades whose work may be affected or have an effect on the installation of the sprayed cellulose fiber.

3.3 INSTALLATION

A. Installation, clean up and curing shall be accomplished according to the manufacturer's recommendations and common construction standards.

B. Provide natural or mechanical ventilation continuously to properly cure the insulation.

3.4 PROTECTION

A. Protect finished installation from damage caused by work of other trades.

END OF SECTION 09 81 00

SECTION 09 84 00 - ACOUSTIC ROOM COMPONENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Fabric-covered acoustic room components.
   2. Pre-assembled wood panels.
   3. Speaker cloth.

B. Related Sections:
   1. Section 05 50 00 - Metal Fabrications: Miscellaneous metal supports.

1.3 REFERENCES

A. ASTM C365/C365M - Standard Test Method for Flatwise Compressive Properties of Sandwich Cores; 2022.

B. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2022.

C. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2019.

D. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

F. ASTM E1111/E1111M - Standard Test Method for Measuring the Interzone Attenuation of Open Office Components; 2014 (Reapproved 2022).

G. ASTM E1414/E1414M - Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum; 2021a.

1.4 SUBMITTALS

A. Product Data:
   1. Manufacturer’s specifications and other data needed to prove compliance with specified requirements.
   2. Manufacturer’s installation instructions.

B. Shop Drawings: Show panel joints, detail references, dimensions and methods of attachment.

C. Samples: 12 inch x 12 inch sample of actual material and color charts showing manufacturer's full range of colors for Architect’s selection.

1.5 QUALITY ASSURANCE

A. Provide acoustical panels, diffusers and fabrics of each type required from one (1) manufacturer of uniform texture and color.

B. Installer. Provide evidence of appropriate experience in system installation and that installation method proposed is acceptable to panel manufacturer.

C. Single Source Responsibility: Obtain acoustical panel materials from a single manufacturer.

1.6 DELIVERY, STORAGE AND HANDLING

A. Carefully protect work during shipment, storage and installation.

B. Deliver materials to job site and store elevated above floor in an enclosed space with proper ventilation and protection from damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
   1. Acoustical Panels:
      a. Acoustical Resources, Inc.
      b. Armstrong World Industries.
      c. Autex Acoustics.
      d. AVL Systems, Inc.
      e. Benton Brothers Solutions, Inc.
      f. Conwed Designscapes.
      g. Decoustics.
      h. Finelite, Inc.: www.finelite.com,
      i. Golterman & Sabo, Inc.
      j. Kirei USA, LLC.
      k. Lamvin, Inc.
      l. MBI Products Company.
      m. Rockfon.
      n. Sky Acoustics.
      o. Sound Concepts.
      p. Wall Technology, Inc.
   2. Fabric Facings:
      a. Guilford of Maine.
   3. Pre-Assembled Wood Panels:
      a. 9Wood, Inc.
      b. Architectural Components Group, Inc.
      c. Conwed Designscape.
      d. Rulon Co.

B. Substitutions: Refer to section 01 25 00 - Substitution Procedures.
   1. Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution

2.2 MATERIALS

A. Fabric-Faced Acoustical Room Components:
   1. Acoustical Room Component Type 1 (ARC-1): All panels over 7 feet-0 inches above finished floor.
      a. Basis of Design Product/Manufacturer: "Basic Series Acoustical Panel" manufactured by Acoustical Resources, Inc.
      b. Type: Absorber Panels.
      c. Core Composition: 6-7 PCF medium density single glass fiber core.
      d. Flame Spread: Class A, 25 or less.
      e. NRC: 1.05 in accordance with ASTM C423.
      f. Panel Edge Profile: Square, chemically hardened.
      g. Size: Two (2) inches thick by size shown on drawings.
   2. Fabric Facing: 100 percent polyester fabric, Guilford of Maine Anchorage - 2335 Series in colors selected by Architect from manufacturer's full range of colors, or approved equal. Finish shall be applied directly to face and edges of the panel and returned onto the back of the panel to provide a full finished edge. All corners shall be fully tailored.
   3. Mounting Accessories:
      a. Top Clips and Brackets:
         1) Factory mounted concealed mechanical "Z" clips screw fastened to the back of resin hardened spots on panel at maximum 24 inch on center spacing.

2) Set clips inboard one (1) to two (2) inches from panel edges.
3) “Z” clips shall engage on galvanized single or double wall brackets with closed ends to prevent lateral panel movement.
4) Clips shall be fabric covered if exposed to view.

b. Bottom: 6 inch hook & loop brackets shall be shimmed on stacked spacer panels to provide even face alignment.

B. Cementitious Wood Fiber Panels:

1. Acoustical Room Component (TCP-01): Cementitious Wood Fiber Panels
   a. Basis of Design: “Tectum Finale” manufactured by Armstrong World Industries, Inc.
   b. Material: Aspen wood fibers bonded with inorganic hydraulic cement.
   c. Thickness: 2 inches.
   d. Edge: Refer to Drawings.
   e. Size:
      1) Walls: 47-3/4 inches wide by 8 feet long.
      2) Ceilings: 59-3/4 inches by 59-3/4 inches.
   f. Color: Sherwin Williams, Black of Night.
   g. Mounting Style: Mounting A.
   h. Location: As indicated on Drawings.

PART 3 EXECUTION

3.1 INSPECTION

A. Verify dimensions to insure proper fabrication of materials.

3.2 INSTALLATION

A. Install wall panels, ceiling diffusers, and fabrics only after all wet work has been completed and temperature conditions approximate conditions when space will be occupied.

B. Install wall panels, ceiling diffusers, and fabrics in accordance with manufacturer's instructions and approved shop drawings.

C. Install wall panels, and ceiling diffusers in proper alignment. Shim wall track as necessary to provide a level framework.

D. Arrange wall panels symmetrically on each wall, unless otherwise indicated, remove wall panels, ceiling diffusers, and fabrics are damaged and unacceptable to Architect and replace with new undamaged materials at no expense to Owner.

END OF SECTION 09 84 00

SECTION 09 90 00 - PAINTING AND COATING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Surface preparation and field painting of exposed items and surfaces.
   2. Field preparation and painting of factory primed metal products and fabrications.
   3. Accessories necessary for a complete installation.

1.3 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2019.

C. ASTM D2486 - Standard Test Methods for Scrub Resistance of Wall Paints; 2017.

D. ASTM D2805 - Standard Test Method for Hiding Power of Paints by Reflectometry; 2011 (Reapproved 2018).

E. ASTM D4828 - Standard Test Methods for Practical Washability of Organic Coatings; 1994.

F. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2023.

G. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.

H. SCAQMD 1113 - Architectural Coatings; 1977, with Amendment (2016).

1.4 DEFINITIONS

A. Standard coating terms defined in ASTM D16 apply.
   1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85 degree meter.
   2. Eggshell refers to low sheen finish with a gloss range between 20 and 35 when measured at a 60 degree meter.
   3. Semi-gloss refers to medium sheen finish with a gloss range between 35 and 70 when measured at a 60 degree meter.
   4. Gloss refers to high sheen finish with a gloss range more than 70 when measured at a 60 degree meter.

1.5 SUBMITTALS

A. Product Data: Submit technical data and information for block fillers, primers, paints, and coatings, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.
   1. Indicate manufacturer's instructions for special surface preparation procedures, substrate conditions requiring special attention.
   2. Material List: Provide inclusive list of required coating materials. Indicate each material and cross reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number, series, and general classification.
   3. Exterior Product Approvals:
      a. Manufacturer shall certify that product complies with and has been tested and approved in compliance with Florida Product Approval or Miami Dade NOA and applicable requirements.

b. Exterior Product Approvals: Manufacturer shall certify that product complies with large [and small] missile impact criteria and has been tested and approved in compliance with Florida Product Approval or Miami Dade NOA and applicable requirements.

B. Samples: Submit for each type of paint system and in each color and gloss of topcoat.
   1. Provide stepped samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing samples for review. Resubmit until required sheen, color, and texture are achieved.
   2. Provide list of material and application for each coat of each sample. Label each sample as to location and application.
   3. Submit samples on following substrates for review of color and texture only:
      a. Concrete: Provide two 4 inch square samples for each color and finish.
      b. Concrete Masonry: Provide two 4 inch x 8 inch samples of masonry, with mortar joint in the center, for each finish and color.
      c. Painted Wood: Provide two 12 inch square samples of each color and material on hardboard.
      d. Ferrous and Nonferrous Metals: Provide two 4 inch square samples of flat metal and two 8 inch long samples of solid metal for each color and finish.

C. Product List: Submit list of including each paint system, color, and location of application. Use same product and location designations indicated in Finish Schedule.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Comply with Federal and local toxicity and air quality regulations and with Federal requirements on content of for heavy metals including but not limited to: lead and mercury. Do not use solvents in paint products that contribute to air pollution.
   2. Performance and Durability:
      a. ASTM D16 Standard Terminology for Paint, Related Coatings, Materials, and Applications.
      b. ASTM D2486 Standard Test Method for Scrub Resistance of Interior Wall Paint.
      c. ASTM D2805 Standard Test Method for Hiding Power of Paints by Reflectometry.
      d. ASTM D4828 Standard Test Method for Practical Washability of Organic Coatings.

B. Applicator Qualifications: A firm or individual having minimum 5 years documented experience in applying paints and coatings similar in material, design, and extent to those indicated.

C. Source Limitations: Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, product name, product code, color designation, VOC content, batch date, environmental handling, surface preparation, application, and use instructions.

C. Paint Materials: Store at a minimum of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

D. Handling: Maintain a clean, dry storage area to prevent contamination or damage to materials.

1.8 FIELD CONDITIONS

A. Apply waterborne paints when temperatures of surfaces to be painted and surrounding air are between 50 degrees F and 90 degrees F.

B. Do not thin or add water to water-based paints, including water based alkyds.

C. Weather Conditions:

1. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
2. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 degrees F above dew point; or to damp or wet surfaces.
3. Minimum Application Temperatures for Water based Paints: Between 50 degrees F and 90 degrees F.

D. Apply solvent thinned paints when temperatures of surfaces to be painted and surrounding air are between 45 degrees F. and 95 degrees F.
1. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.
2. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.

E. Provide lighting level of 80 foot candles measured midheight at substrate surface.

F. Labels: Do not paint over Underwriters Laboratories, Factory Mutual, other code required labels, or equipment name, identification, performance rating, or nomenclature plates.

1.9 WARRANTY

A. Written warranty signed by the manufacturer and the installer in which the manufacture and installer agree to repair or replace paint and primers that fail within specified warranty period.
1. Failures include, but are not limited to, the following:
a. Flaking or delamination of paint with the substrate.
b. Rust, scale, similar imperfections due to improper surface preparation.
c. Thinning or watering of paint beyond that considered acceptable of paint manufacturer.
d. Failure to achieve dry film thickness (DFT) recommended by manufacturer for each coat in a paint system.
e. Deterioration or loss of color of paint beyond normal weathering.
2. Warranty Period: One year from date of Substantial Completion.

1.10 EXTRA MATERIALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Paint: 2 percent, but not less than 1 gallon of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
1. Benjamin Moore & Co.: www.benjaminmoore.com.
2. The Sherwin-Williams Company: www.sherwin-williams.com.

B. Substitutions: Refer to section 01 25 00 - Substitution Procedures.
1. Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution

2.2 MATERIALS

A. Basis of Specifications: The Sherwin-Williams Company.

B. Subject to compliance with requirements, provide first quality, 100% acrylic, commercial or industrial products of one of the specified manufacturers. Residential products are not permitted.

C. Proprietary Names: Paint Schedule is based on a single manufacturer for convenience. Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that named products are required to the exclusion of comparable products of specified manufacturers. Furnish product technical data, including percent solids by weight and volume; VOC content limits and emissions data; and certificates of performance for comparable paint products of specified manufacturer.

D. Subject to compliance with requirements, provide first quality, 100% acrylic, commercial or industrial products of one of the specified manufacturers. Residential products are not permitted.

E. Material Compatibility: Provide each paint system including block fillers, primers, and finish coats, that are compatible with one another and with substrates indicated under conditions of service and application, demonstrated by manufacturer based on testing and field experience.

F. Material Quality: Provide manufacturer's best quality commercial paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint material containers not displaying manufacturer's product identification will not be acceptable. Residential quality paint products are not permitted.

G. Chemical Components of Interior Paints and Coatings: Provide products complying with limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and SCAQMD 1113.
   1. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
   2. Restricted Components: Paints and coatings shall not contain components restricted by the EPA and SCAQMD 1113.

H. Materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

I. Patching Materials: Latex filler compatible with paint systems.

J. Fastener Head Cover Materials: Latex filler.

2.3 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke to engage the services of a qualified testing agency to sample paint materials.
   1. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to site, samples may be taken at the site. Samples will be identified, sealed, and certified by testing agency.
   2. Testing agency will perform tests for compliance with product requirements.
   3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

2.4 PAINT COLOR SCHEDULE

A. Colors (P-#):
   1. PT-1 - :
      a. Manufacturer: The Sherwin-Williams Company.
      b. Color: SW 7004, Snowbound.
      c. Sheen: As selected by Architect.
      d. Locations: Refer to Drawings.
   2. PT-2 - :
      a. Manufacturer: The Sherwin-Williams Company.
      b. Color: SW 7647, Crushed Ice.
      c. Sheen: As selected by Architect.

d. Locations: Refer to Drawings.

3. PT-3 - :
   a. Manufacturer: The Sherwin-Williams Company.
   b. Color: SW 7672, Knitting Needles.
   c. Sheen: As selected by Architect.
   d. Locations: As indicated on Drawings.
4. PT-4 - :
   a. Manufacturer: The Sherwin-Williams Company.
   b. Color: SW 7669, Summit Gray.
   c. Sheen: As selected by Architect.
   d. Locations: As indicated on Drawings.
5. PT-5 - :
   a. Manufacturer: The Sherwin-Williams Company.
   b. Color: SW 6993, Black of Night.
   c. Sheen: As selected by Architect.
   d. Locations: As indicated on Drawings.
6. PT-6 - :
   a. Manufacturer: PPG Industries, Inc.
   b. Color: PPG 1162-5, Shrinking Violets.
   c. Sheen: As selected by Architect.
   d. Locations: As indicated on Drawings.
7. PT-8 - :
   a. Manufacturer: The Sherwin-Williams Company.
   b. Color: SW 6083, Sable.
   c. Sheen: As selected by Architect.
   d. Locations: As indicated on Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for maximum moisture content and conditions affecting performance of the work.

B. Test substrates after repairing and cleaning substrates but prior to application of paint and coatings.
   1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
      a. Concrete: 12 percent.
      b. Fiber Cement Board: 12 percent.
      c. Masonry (Clay and CMUs): 12 percent.
      d. Wood: 15 percent.
      e. Gypsum Board: 12 percent.
      f. Plaster: 12 percent.
   2. Test cementitious and plaster cement/stucco for alkalinity (pH).

C. Gypsum Board Substrates: Verify taped joints are tapes and finishing compound is sanded smooth.

D. Plaster Substrates: Verify plaster has fully cured. Verify existing plaster is in good condition and can receive new paint coating.

E. Spray Textured Ceiling Substrates: Verify surfaces are dry.

F. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

1. Verify previously painted surfaces can be stripped to bare substrate, repaired if necessary, and prepared to receive new paint system consisting of primer and two top coats at a minimum.
    a. Note: Previously painted surfaces have failed to accept new paint systems. Determined cause of failure and take corrective measures to ensure each surface accepts new paint system. Failure of new paint system is not permitted.

G. Commence paint and coating application after correcting unsatisfactory conditions and surfaces are dry. Application of coating indicates applicator’s acceptance of surfaces and conditions.

3.2 ITEMS TO RECEIVE PAINT

A. Generally, all new items that are normally painted in any typical building, including but not limited to the following list:
    1. All ferrous metal.
    2. All exterior galvanized metal.
    3. All exterior wood.
    4. All interior wood.
    5. All prime coated hardware.
    6. All exposed pipe, plumbing, ductwork, conduit, outlet boxes and electrical cabinets, excluding those located in mechanical rooms.
    7. All metal grilles, except aluminum, unless otherwise indicated.
    8. All exposed gypsum board surfaces, including all mechanical rooms.
    9. Miscellaneous other items which normally require painting or are scheduled to be painted.
    10. Consult plans, finish schedule, details and specifications for other trades as all items usually field painted or finish will be considered as part of the Contract.
    11. All exposed mechanical equipment and electrical equipment.
    12. Traffic lanes and parking spaces including fire lanes and crosswalks.
    13. Rolling doors.
    14. Bollards.
    15. Loose lintels.
    16. Refer to MEP specifications for additional items to receive paint.

B. All work where a coat of material has been applied must be inspected and approved by Architect before application of succeeding specified coat, otherwise no credit for coat applied will be given. Notify Architect when a particular coat has been completed for inspection and approval. Apply coats of material in strict accordance with manufacturer's specifications except where requirements of these specifications are in excess of manufacturer's requirements. Paint all sight exposed pipe and plumbing only after all mechanical work and tests have been completed.

3.3 PREPARATION

A. Coordination of Work: Review work in which primers are provided to ensure compatibility of the total system for various substrates. Notify Architect of anticipated problems when using materials specified over substrates primed by others.
    1. Pre-Primed Substrates: Inspect existing conditions in which primers are factory applied to ensure compatibility of the total system for each substrate. Notify Architect of anticipated problems when using the materials specified over factory primed or pre-primed substrates.
    2. Existing Painted Surfaces: Inspect previously painted surfaces to ensure compatibility of the existing paints with new paint system for each substrate. Notify Architect of anticipated problems.
    3. Correct defects and clean surfaces affecting bond with paint system. Remove existing paints exhibiting loose surface defects showing signs of rust, scale, or delamination.
    4. Seal marks which may bleed through surface finishes.

B. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified. Provide barrier coats over incompatible primers or remove and reprime. If removal is impractical or impossible

because of size or weight of item, provide surface applied protection before surface preparation and painting.

1. Remove hardware and hardware accessories, plates, lighting fixtures, and similar items that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface applied protection before surface preparation and painting. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
2. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface applied protection if any.
3. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
4. Clean and prepare surfaces to receive paint according to manufacturer's written instructions for each substrate condition and as specified. Provide barrier coats over incompatible primers, existing paint or coating, or remove and reprime.
5. Correct defects and clean surfaces affecting bond with paint or coating system. Remove existing coatings exhibiting loose surface defects. Seal marks which may bleed through surface finishes.

C. Cleaning: Before applying paint or surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning. Schedule cleaning and painting so dust and contaminants from the cleaning process will not fall on wet, newly painted surfaces.

1. Remove incompatible primers, including factory applied primers, and reprime substrate with compatible primers or apply barrier coat as necessary to produce paint systems indicated.
2. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
3. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.
4. Galvanized Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
5. Aluminum Substrates: Remove surface oxidation.

D. Mildew and Mold Removal: Remove mildew and mold by high power washing (pressure range of 1500 to 4000 psi) with solution of trisodium phosphate and bleach. If substrate is too soft for high power washing, scrub substrate with solution. Rinse with clean water and allow surface to dry.

E. Protective Coverings: Provide protections for duration of the work, including covering furnishings and decorative items. Protect and mask adjacent finishes and components against damage, marking, overpainting, and injury. Clean and repair or replace damage caused by painting.

F. Renovated Surfaces: Clean surface free of loose dirt and dust. Except at gypsum board surfaces, remove existing paint and coatings to bare substrate and prepare substrates to receive new paint system. Test substrate to verify it will bond with primer and receive new paint system without failure. If test fails, clean surface to base substrate and apply barrier coat. Retest to verify surface will accept new paint system.

1. Remove surface film preventing proper adhesion and bond.
2. Wash glossy paint with a solution of sal soda and rinse thoroughly.
3. Remove loose, blistered, and defective paint and varnish; smooth edges with sandpaper.
4. Clean corroded iron and steel surfaces.
5. Repair and blend into portland cement plaster.
6. Prime bare surfaces.
7. Tone varnished surfaces with stain bringing to uniform color.

8. If existing surfaces cannot be put in acceptable condition for finishing by customary cleaning, sanding, and puttying operations, notify Owner and do not proceed until correcting unsatisfactory conditions.

G. Cementitious Substrates: Prepare concrete surfaces to receive paint. Remove efflorescence, chalk, dust, dirt, grease, oils, release agents, mold, mildew, and existing paint. Roughen as necessary to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
   1. Use abrasive blast cleaning methods if recommended by paint manufacturer.
   2. Do not paint surfaces if moisture content or alkalinity of surfaces exceeds that permitted in manufacturer's written instructions.
      a. Determine alkalinity and moisture content of surfaces by performing appropriate pH testing. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct condition prior to application of paint.
      b. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.3 kg of water/92.9 sq. m).
      c. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation after substrates have obtained percent relative humidity level recommended by paint manufacturer.
      d. Perform additional moisture tests when recommended by manufacturer. Proceed with installation when moisture content complies with that permitted in manufacturer's written instructions.
      e. Remove stains caused by weathering of corroding metals with solution of sodium metasilicate after thoroughly wetting with water. Allow to thoroughly dry.
   3. Clean concrete floors to receive paint or coating with a 5 percent solution of muriatic acid or etching cleaner. Flush floors with clean water to remove acid; neutralize with ammonia, rinse, allow to dry; vacuum before painting.

H. Ferrous Metals: Clean ungalvanized ferrous metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC recommendations.
   1. Blast steel surfaces clean as recommended by paint system manufacturer and according to SSPC-SP 6/NACE No. 3.
   2. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
   3. Touch up bare areas and shop-applied prime coats that have been damaged. Wire brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.

I. Galvanized Ferrous Metal Substrates: Clean galvanized surfaces with nonpetroleum based solvents leaving surface free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

J. Shop Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop primed surfaces.

K. Aluminum Substrates: Clean surfaces to remove oil, grease, surface oxidation, and contaminants in accordance with SSPC SP-1 Solvent Cleaning. Lightly abrade surface with a nonmetallic pad.

L. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

M. Plaster/Stucco Substrates: Remove contaminants, release agents, curing compounds, efflorescence, chalk, mold, mildew, and similar deterrents. Spot patch existing plaster to eliminate blisters, buckles, excessive crazing, and to check cracking, dryouts, efflorescence,

sweat outs, and similar deflects the prevent plaster from bonding with paint or coatings. Sand or texture repair or patch to match adjacent finish and to remove trowel marks and arrises.

1. Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
2. Deep Cracks: Clean out and fill deep cracks with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
3. Do not paint surfaces if moisture content or alkalinity of surfaces exceeds that permitted in manufacturer's written instructions. Test for alkali using litmus paper.
4. Allow patching and repair compounds to set and cure before painting.

N. Gypsum Board Surfaces: Fill minor defects with filler compound. Spot prime defects after repair.

O. Wood Substrates:

1. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime, stain, or seal wood to be painted. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.
4. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
5. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

P. Pipe Covering and Insulation: Clean to remove loose, foreign, and objectionable material before applying sealing coat.

Q. Preparation of Substrates for Wallcovering: Prime and seal substrate with release coat in accordance with wallcovering manufacturer's recommendations for substrate.

1. Assure compatibility with product of wall covering manufacturer.
2. Fill indentations in substrate and prime with opaque white primer before applying release coat.
3. Apply release coat in accordance with manufacturer's recommendations.

R. Barrier Coat: Provide barrier coats over incompatible primers or remove and reprime. Notify Owner in writing of anticipated problems using specified finish coat material over previously coated substrates.

S. Material Preparation: Mix and prepare paint materials according to manufacturer's written instructions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
3. Do not use thinners for water-based paints.
4. Tinting: Tint each undercoat a lighter shade to facilitate identification of each coat where multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.4 APPLICATION

A. Comply with manufacturer’s written instructions and recommendations applicable to substrates and paint systems indicated.

1. The term exposed surfaces includes areas visible when permanent or built in fixtures, grilles, convector covers, covers for finned tube radiation, and similar components are in place. Extend coatings in these areas to maintain system integrity and provide desired protection.

2. Use applicators and techniques suited for paint and substrate indicated.
3. Provide finish coats compatible with primers.
4. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
5. Paint exposed surfaces. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces.
    a. Field painting of exposed surfaces include bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory applied final finish.
    b. Areas visible when permanent or built in fixtures, grilles, convector covers, covers for finned tube radiation, and similar components are in place.
    c. Extend coatings in areas, as required, to maintain system integrity and provide desired protection.
6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
7. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
8. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
9. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
10. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or surface imperfections. Cut in sharp lines and color breaks.
11. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
12. Provide finish coats compatible with primers used.
13. Sand lightly between each succeeding enamel or varnish coat.

B. Items not to Receive Paint: Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

C. Applicators: Apply paints and coatings by brush, roller, spray, or applicators recommended by manufacturer.
    1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
    2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool recommended by manufacturer for material and texture required.
    3. Spray Equipment: Use airless spray equipment with orifice size recommended by manufacturer for material and texture required.

D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.
    1. Measure film thickness on magnetic surfaces by use of Elcometer thickness gauge and on nonmagnetic surfaces by pit gauge or Tooke Gauge.

E. Application: Apply first coat to surfaces that have been cleaned, pretreated, or prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
    1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer.

2. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished after removing rust and scale and priming or touching up surface sand if acceptable to topcoat manufacturers.
3. If undercoats, stains, or conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive dry film thickness equivalent to that of flat surfaces.
4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried and cured to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.

F. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces.
1. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
2. Prime and paint uninsulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, heat exchangers, tanks, ductwork, conduit, switchgear, and paintable insulation except where items are prefinished.
3. Paint interior surfaces of air ducts, and convector and baseboard heating cabinets visible through grilles and louvers with one coat of flat black paint, to visible surfaces. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
4. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
5. Color code equipment, piping, conduit, and exposed duct work in accordance with requirements indicated. Color band and identify with flow arrows, names, and numbering.
6. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.
7. Concealed Members: Wherever steel and metal parts to receive paint are built into and concealed by construction, paint as specified for exposed parts so finish painting is complete before members are concealed.

G. Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work: Painting is limited to items exposed in equipment rooms and occupied spaces.
1. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
2. Prime and paint uninsulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, heat exchangers, tanks, ductwork, conduit, switchgear, and paintable insulation except where items are prefinished.
3. Paint interior surfaces of air ducts, and convector and baseboard heating cabinets visible through grilles and louvers with one coat of flat black paint, to visible surfaces. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
4. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
5. Color code equipment, piping, conduit, and exposed duct work in accordance with requirements indicated. Color band and identify with flow arrows, names, and numbering.
6. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

H. Electrostatic Spray Painting: Apply coating electrostatically to finished surfaces, free from runs, sags, visible overlaps, holidays, craters, pinholes and other defects detrimental to protective and decorative qualities of coating.
1. Thickness of Coatings: 1.5 to 2.0 mils dry film thickness. Measure dry film thickness with magnetic gauge.

2. Use application techniques, equipment, materials, and preparation procedures recommended by manufacturer.

I. Block Fillers: Apply block fillers to concrete masonry block at rate to ensure complete coverage with pores filled.

J. Prime Coats: Before applying finish coats, apply prime coat, recommended by manufacturer, to material required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or defects due to insufficient sealing.

K. Finish Coats: Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance without bleed through.
   1. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or surface imperfections is not acceptable.
   2. Transparent (Clear) Finishes: Use multiple coats to produce glass smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections. Provide satin finish for final coats.

L. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

M. Touch Up: Touch up marred, scraped, and blemished areas of surfaces which were factory primed or previously coated.
   1. Prepare and touch up scratches, abrasions, and blemishes and remove foreign matter before proceeding with succeeding coats.
   2. Touch up marred, scraped, and blemished areas of factory primed or previously coated surfaces.
   3. Feather touch up coating overlapping minimum 2 inches onto adjacent unblemished areas producing smooth, uniform surface.
   4. As soon after erection and installation as possible, touch up fasteners, welded surfaces and surroundings, field connections, and areas on which shop coat has been abraded or damaged with specified primer before corrosion and other damage occurs from exposure.

3.5 FIELD QUALITY CONTROL

A. Dry Film Thickness (DFT) Testing: Tests for dry film thickness may be determined by using a Tooke Scale and microgroover, an electronic scanner, or the Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
   1. Contractor shall touch up and restore painted surfaces damaged by testing.
   2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.6 CLEANING AND PROTECTION

A. It is of the upmost important to the Owner that the sites remain in a safe, clean, and well maintained condition. At the end of each day, leave the site ready to use by staff and students. Protect staff and students and the learning environment throughout the work.

B. Cleanup: At the end of each day, remove empty cans, rags, rubbish, and discarded paint materials from site. After completion of painting work, clean glass and paint spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. Provide “Wet Paint” signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work. After related work is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

E. At completion of painting activities, touch up and restore damaged or defaced painted surfaces.

F. Waste Management: Legally dispose of unused paint and paint containers in accordance with manufacturer’s recommendations and environmental regulations.

PART 4 - SCHEDULES

4.1 GENERAL

A. The following is a schedule of typical painted items and does not specifically include every item that is to receive paint but should establish type and quality of finish for all items normally included in a complete paint job.

B. Overhead Painting (Ceilings, Exposed to Structure Above, etc.)
   1. Use a dryfall system comparable to system defined below for substrate.

4.2 SHERWIN-WILLIAMS APPLICATION SCHEDULES

A. Exterior Surfaces: Note: Exterior surfaces are divided into two (2) different categories, based upon color and level of graffiti resistance required. System 1 will be used when standard earthtone colors or neutral colors are specified, and System 2 will be used when bright colors (primary reds, yellows, and oranges) are specified and/or when a graffiti resistant coating is required.
   1. Galvanized Metal:
      a. Surface Preparation: Acid etch galvanized surfaces that have not weathered at least six (6) months prior to beginning painting operations.
      b. Primer: One (1) coat Pro-Cryl Pro Industrial Universal Primer (B66W310)
      c. Finish: Two (2) coats Sher-Cryl HPA High Performance Acrylic (B66W300).
   2. Galvanized Metal: Chloramine environment.
      a. Surface Preparation: Acid etch galvanized surfaces that have not weathered at least six (6) months prior to beginning painting operations.
      b. Primer: One (1) coats Macropoxy 646 (B58-600).
      c. Finish: Two (2) coats Acrolon 218 HS Acrylic Polyurethane (B65-600).
   3. Un-galvanized Metal:
      a. Primer: One (1) coat Pro-Cryl Pro Industrial Universal Primer (B66W310).
      b. Finish: Two (2) coats Sher-Cryl HPA High Performance Acrylic (B66W300).
   4. Pre-Finished Metal Surfaces:
      a. Surface Preparation: As recomme3nded by primer manufacturer.
      b. Primer: One (1) coat Bond-Plex Water-based Acrylic.
         1) OR
         2) Primer: One (1) coat DTM Bonding Primer.
      c. Finish: Two (2) coats Bond-Plex Water-based Acrylic.
   5. Concrete and CMU:
      a. Primer/Finish: (2) coats Loxon XP Exterior Waterproofing System, 14-18 mils wet, 6.4 – 8.3 mils dry per coat.
   6. Tilt-Up Concrete:
      a. Primer: One (1) coat Loxon Concrete and Masonry Primer Sealer (LX02W50), 5.3-8.0 mils wet, 2.1-3.2 mils dry.
      b. Finish: One (1) coat Conflex UltraCrete Acrylic Textured Finish, Texture: Fine, Base Color: CF17W0811 Medium Extra White.

7. Wood (Includes plywood siding and wooden trim):
    a. Primer: One (1) coat A-100 Latex Wood Primer (B42W41).
    b. Finish: Two (2) coats A-100 Acrylic Gloss (A8 ser.).
8. Fiber-Cement Materials:
    a. Primer: One (1) coat Loxon Masonry Primer (A24W300).
    b. Finish: Two (2) coats A-100 Acrylic Gloss (A8 Series).
9. Parking Line and Driveway Paint: Setfast Waterborne Yellow (TM225) (meets Federal Specification (FS) TTP-1952-B)

B. Interior Surfaces:
1. Concrete Substrates, Non-Traffic Surfaces and Clay Masonry:
    a. Latex System:
        1) Prime Coat: Loxon Concrete & Masonry Primer Sealer, A24W8300, at 8.0 mils wet, 3.2 mils dry.
        2) Intermediate Coat: Latex, interior, matching topcoat.
        3) Topcoat:
            (a) Flat: ProMar 200 Zero VOC Latex Flat, B30-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
            (b) Low Sheen: ProMar 200 Zero VOC Latex Low Sheen Eg-Shel, B24-2600 Series, at 4.0 mils wet, 1.6 mils (dry, per coat.
            (c) Eggshell: ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series, at 4.0 mils wet, 1.7 mils dry, per coat.
            (d) Semi-Gloss: ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
            (e) Gloss: ProMar 200 Zero VOC Gloss, B21-12650 Series, at 4.0 mils wet, 1.4 mils dry, per coat.
    b. Water-Based Light Industrial Coating System:
        1) Prime Coat: Loxon Concrete & Masonry Primer Sealer, A24W8300, at 8.0 mils wet, 3.2 mils dry.
        2) Intermediate Coat: Latex, interior, matching topcoat.
        3) Topcoat:
            (a) Eggshell: Pro Industrial Pre-Catalyzed Water Based Epoxy, K45-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
            (b) Semi-Gloss: Pro Industrial Pre-Catalyzed Water Based Epoxy, K46-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
2. Concrete Substrates, Pedestrian Traffic Surfaces:
    a. Latex Floor Enamel System:
        1) First Coat: Floor paint, latex, slip-resistant, matching topcoat.
        2) Topcoat: Floor paint, latex, slip-resistant, low gloss: S-W ArmorSeal Tread-Plex, B90 Series, at 1.5 to 2.0 mils dry per coat.
3. Flat: Galvanized Metal:
    a. Latex System:
        1) Prime Coat: One (1) coat Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, at 5.0 to 10 mils wet, 2.0 to 4.0 mils dry.
        2) Intermediate Coat: Water-based acrylic, interior, matching topcoat.
        3) Topcoat:
            (a) Semi-Gloss: Pro Industrial Acrylic Semi-Gloss Coating, B66-650 Series, at 2.5 to 4.0 mils dry, per coat.
            (b) Gloss: Pro Industrial Acrylic Gloss Coating, B66-660 Series, at 2.5 to 4.0 mils dry, per coat.
    b. Water-Based Dry-Fall System:
        1) Top Coat:
            (a) Flat: S-W Pro Industrial Waterborne Acrylic Dryfall Flat, B42-181 Series, at 6.0 mils wet, 1.5 mils dry.

(b) Eggshell: Pro Industrial Waterborne Acrylic DryFall Eg-Shel, B42-82, at 6.0 mils wet, 1.9 mils dry.
(c) Semi-Gloss: Pro Industrial Waterborne Acrylic DryFall Semi-Gloss, B42-83, at 5.8 mils wet, 2.3 mils dry.

c. Water-Based Light Industrial Coating System:
1) Prime Coat: Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, at 5.0 to 10 mils wet, 2.0 to 4.0 mils dry.
2) Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
3) Top Coat:
(a) Eggshell: Pro Industrial Pre-Catalyzed Water Based Epoxy, K45-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
(b) Semi-Gloss: Pro Industrial Pre-Catalyzed Water Based Epoxy, K46-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

4. Shop-Primed Ferrous Metals (Use for metal doors and frames and miscellaneous metal items):
a. Shop coat by others.
b. One (1) coat over Steel Kem Kromik Primer B50series.
c. One (1) coat over Aluminum Metal Procryl Primer B60series.
d. Two (2) coats PM200 Alkyd Semi-Gloss B34series.

5. Wood: (Painted)
a. Latex System:
1) Prime Coat: PrepRite ProBlock Primer Sealer, B51-620 Series, at 4.0 mils wet, 1.4 mils dry.
2) Intermediate Coat: Latex, interior, matching topcoat.
3) Topcoat:
(a) Eggshell: ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series, at 4.0 mils wet, 1.7 mils dry, per coat.
(b) Semi-Gloss: ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
(c) Gloss: ProMar 200 Zero VOC Gloss, B21-12650 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

b. Water/Alkyd Urethane System:
1) Prime Coat: Premium Wall & Wood Primer, B28W8111, at 4.0 mils wet, 1.8 mils dry.
2) Intermediate Coat: Water-based alkyd-urethane, interior, matching topcoat.
3) Topcoat:
(a) Semi-Gloss: Pro Industrial Water-based Alkyd Urethane Semi-Gloss, B53-1150 Series, at 4.0 mils wet, 1.4 mils (dry, per coat.
(b) Gloss: Pro Industrial Water-based Alkyd Urethane Gloss, B53-1050 Series, at 4.0 mils wet, 1.4 mils dry, per coat.

c. Water-Based Light Industrial Coating:
1) Prime Coat: PrepRite ProBlock Primer Sealer, B51-620 Series, at 4.0 mils wet, 1.4 mils dry.
2) Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
3) Topcoat:
(a) Eggshell: Pro Industrial Pre-Catalyzed Water Based Epoxy, K45-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
(b) Semi-Gloss: Pro Industrial Pre-Catalyzed Water Based Epoxy, K46-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.

6. Wood: (Stained)
a. Stain: SherWood BAC Wiping Stain (S64 Series).
b. Finish (First Coat): Wood Classics Polyurethane Varnish (A67 Series).

c. Finish (Second Coat): Wood Classics Polyurethane Varnish (A67 Series).

7. Gypsum Board and Plaster:
   a. Latex System:
      1) Prime Coat: ProMar 200 Zero VOC Latex Primer, B28W2600, at 4.0 mils wet, 1.0 mils dry.
      2) Intermediate Coat: Latex, interior, matching topcoat.
      3) Topcoat:
         (a) Flat: ProMar 200 Zero VOC Latex Flat, B30-2600 Series, at 4.0 mils wet, 1.6 milsdry, per coat.
         (b) Low Sheen: ProMar 200 Zero VOC Latex Low Sheen Enamel, B24-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
         (c) Eggshell: ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series, at 4.0 mils wet, 1.7 mils dry, per coat.
         (d) Semi-Gloss: ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
         (e) Gloss: ProMar 200 Zero VOC Gloss, B21-12650 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
   b. Water-Based Light Industrial Coating System:
      1) Prime Coat: ProMar 200 Zero VOC Latex Primer, B28W2600, at 4.0 mils wet, 1.0 mils dry.
      2) Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
      3) Topcoat:
         (a) Eggshell: Pro Industrial Pre-Catalyzed Water-based Epoxy, K45-151 Series, at 4.0 mils wet, 1.5 mils dry, per coat.
         (b) Semi-Gloss: Pro Industrial Pre-Catalyzed Water-based Epoxy, K46-151 Series, at 4.0 mils wet, 1.5 mils (dry, per coat.
8. CMU: (Epoxy) - Kitchens, bathrooms, laboratories, etc.
   a. Primer: Two (2) coats Heavy Duty Block Filler (B42W46).
   b. Finish: Two (2) coats Water-Based Catalyzed Epoxy (B70/B60).
9. Pipe and fittings, including but not limited to copper and brass, at kitchen areas (but excluding aluminum, stainless steel, nickel and chrome plated pipe and fittings):
   a. Primer: One (1) coat; product recommended for the substrate by the finish coat manufacturer.
   b. Finish: Two (2) coats bright aluminum paint.

END OF SECTION 09 90 00

SECTION 10 11 00 - VISUAL DISPLAY UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Chalkboards.
   2. Tackboards.
   3. Horizontal sliding visual display units.

B. Related Sections:
   1. Section 06 10 00 - Rough Carpentry: Blocking and supports.
   2. Section 06 20 00 - Finish Carpentry: Wood frame and marker rails.
   3. Section 09 21 16 - Gypsum Board Assemblies: Concealed supports in metal stud walls.
   4. Section 09 90 00 - Painting and Coating: Finishing of wood frame and marker rail.

1.3 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.

B. ANSI A135.4 - Basic Hardboard; 2012 (Reaffirmed 2020).

C. ANSI A208.1 - American National Standard for Particleboard; 2022.

D. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015 (Reaffirmed 2020).

E. ASTM A424/A424M - Standard Specification for Steel, Sheet, for Porcelain Enameling; 2018.

F. ASTM C208 - Standard Specification for Cellulosic Fiber Insulating Board; 2012, with Editorial Revision (2019).

G. ASTM C1036 - Standard Specification for Flat Glass; 2021.

H. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.

I. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2019.

J. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.

K. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

L. ASTM F793/F793M - Standard Classification of Wall Coverings by Use Characteristics; 2025.

M. PS 1 - Structural Plywood; 2009 (Revised 2019).

1.4 SUBMITTALS

A. Refer to Section 01 33 00 - Submittal Procedures, for submittal procedures.

B. Product Data: Provide manufacturer's data on chalkboard, porcelain enamel steel markerboard, glass markerboard, tackboard, tackboard surface covering, trim, and accessories.

C. Shop Drawings: Indicate wall elevations, dimensions, joint locations, special anchor details.

D. Samples: Color charts for selection of color and texture of chalkboard, porcelain enamel steel markerboard, glass markerboard, tackboard, tackboard surface covering, and trim.

E. Samples: Two, 2 by 2 inches in size illustrating materials and finish, color and texture of chalkboard, porcelain enamel steel markerboard, glass markerboard, tackboard, tackboard surfacing, and trim.

F. Test Reports: Show compliance to specified surface burning characteristics requirements.

G. Manufacturer's printed installation instructions.

H. Manufacturer's Qualification Statement.

I. Maintenance Data: Include data on regular cleaning, stain removal.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.6 WARRANTY

A. Refer to Section 01 77 00 - Closeout Procedures and Checklist for additional warranty requirements.

B. Provide five year warranty for chalkboard and markerboard to include warranty against discoloration due to cleaning, crazing or cracking, and staining.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Specifications are based on the products identified as Basis of Design. Manufacturers listed whose products meet or exceed the specifications are approved for use in the Work. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.

B. Substitutions: Refer to section 01 25 00 - Substitution Procedures.

2.2 VISUAL DISPLAY UNITS

A. Chalkboard: Chalkboard enamel on hardboard.
   1. Color: Green.
   2. Hardboard Face Sheet Thickness: 1/4 inch.
   3. Core: Particleboard, manufacturer's standard thickness, laminated to face sheet.
   4. Backing: Aluminum foil, laminated to core.
   5. Size: As indicated on Drawings.
   6. Frame: Extruded aluminum, with concealed fasteners.
   7. Frame Profile: As indicated on drawings.
   8. Frame Finish: Anodized, natural.
   9. Accessories: Provide marker tray.
   10. Acceptable Products:
      a. Products manufactured by Nelson Adams NACO.

B. Tackboards: Fine-grained, homogeneous natural cork.
   1. Cork Thickness: 1/8 inch.
   2. Fabric: Vinyl coated fabric.
   3. Color: As selected by Architect from manufacturer's full range.
   4. Backing: Hardboard, 1/4 inch thick, laminated to tack surface.
   5. Surface Burning Characteristics: Flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.
   6. Size: As indicated on drawings.
   7. Height: 48 inches.
   8. Length: As indicated on drawings.
   9. Length: 6 feet , in one piece.
   10. Frame: Same type and finish as for chalkboard.
   11. Frame: Extruded aluminum , with concealed fasteners.
   12. Frame Profile: As indicated on drawings.
   13. Frame Finish: Anodized, natural.
   14. Accessories: Provide map rail.

15. Acceptable Products:
    a. AJW Architectural Products: www.ajw.com/#sle.
    b. ASI Visual Display Products: www.asi-visualdisplayproducts.com/#sle.
    c. Claridge Products and Equipment, Inc.
    d. Egan Visual Corporation; Egan Visual TackBoards: www.egan.com/#sle.
    e. Nelson Adams NACO: www.nelsonadamsnaco.com/#sle.

C. Horizontal Sliding Visual Display Unit: Cabinet with sliding panels and fixed rear panel.
1. Cabinet:
    a. Tracks: Two.
    b. Frame Finish: Anodized, natural.
2. Configuration:
    a. Two-Track:
        1) Fixed Rear Panel: Full length of unit.
        2) 2 Sliding Panels: Each panel not less than one-half of unit length.
3. Sliding Panels: Markerboard, Chalkboard, and Tackboard.
4. Fixed Rear Panel: Chalkboard.
5. Sliding Panels - General:
    a. Size: As indicated on drawings.
    b. Frame: Extruded aluminum, with concealed fasteners.
    c. Frame Profile: As indicated on Drawings.
    d. Frame Finish: Anodized, natural.
    e. Nylon Rollers: Two per panel up to 4 feet wide and three per panel up to 8 feet wide.
    f. Nylon Guides: Two per panel up to 4 feet and three per panel up to 8 feet wide.
    g. Finger Pulls: One pair per sliding panel.
6. Sliding Chalkboard Panels: Porcelain enamel on steel, laminated to core.
    a. Color: White.
    b. Steel Face Sheet Thickness: 24 gauge, 0.0239 inch.
    c. Hardboard Face Sheet Thickness: 1/4 inch.
    d. Core: Particleboard, manufacturer's standard thickness, laminated to face sheet.
    e. Backing: Aluminum foil, laminated to core.
7. Sliding Markerboard Panels: Porcelain enamel on steel, laminated to core.
    a. Color: White.
    b. Steel Face Sheet Thickness: 24 gauge, 0.0239 inch.
    c. Core: Particleboard, manufacturer's standard thickness, laminated to face sheet.
    d. Backing: Aluminum foil, laminated to core.
8. Sliding Tackboard Panels: Fine-grained, homogeneous natural cork.
    a. Cork Thickness: 1/8 inch.
    b. Fabric: Vinyl coated fabric.
    c. Color: As selected from manufacturer's full range.
    d. Backing: Hardboard, 1/4 inch thick, laminated to tack surface.
    e. Surface Burning Characteristics: Flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.
9. Accessories: Provide marker tray and map rail.
10. Basis of Design Product(s):
    a. Claridge Products and Equipment, Inc.
    b. Nelson Adams NACO.

D. Combination Units and Units Made of More Than One Panel: Factory-assembled chalkboards, markerboards, and tackboards in a single frame, of materials specified above.
1. Join panels of different construction with H-shaped extruded aluminum molding finished to match frame.
2. Join panels of similar construction with butt joints, aligned and secured with steel spline concealed in edge of core.

3. Configuration: As indicated on Drawings.
4. Units Too Large to Ship Assembled: Fully assembled in factory, then disassembled for shipping.

2.3 MATERIALS

A. Porcelain Enameled Steel Sheet: ASTM A424/A424M, Type I, Commercial Steel, with fired-on vitreous finish.

B. Hardboard for Chalk Surface: ANSI A135.4 Tempered type.

C. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
1. Laminated Safety Glass: Comply with ANSI Z97.1 - Class B or 16 CFR 1201 - Category I impact test requirements.
2. Polyvinyl Butyral (PVB) Interlayer: 0.030 inch thick, minimum.
3. Ionoplast Interlayer: 0.035 inch thick, minimum.

D. Vinyl Coated Fabric: ASTM F793 Category VI.

E. Burlap: Tightly woven, flame retardant treated.

F. Plywood: PS 1 Grade C-D , softwood.

G. Hardboard for Cores: ANSI A135.4, Class 1 - Tempered, S2S (smooth two sides).

H. Particleboard: ANSI A208.1; wood chips, set with waterproof resin binder, sanded faces.

I. Gypsum Board: ASTM C1396/C1396M, paper/foil faced, plain type.

J. Fiber Board: ASTM C208, cellulosic fiber board.

K. Foil Backing: Aluminum foil sheet, 0.005 inch thick.

L. Aluminum Sheet Backing: 27 gauge, 0.014 inch thick.

M. Steel Sheet Backing: 28 gauge, 0.0149 inch, galvanized.

N. Adhesives: Type used by manufacturer.

2.4 ACCESSORIES

A. Wood Frames: Factory assembled red oak, with factory applied clear varnish finish.

B. Wood Frames: Refer to Section 06 20 00 - Finish Carpentry.

C. Map Rail: Extruded aluminum, manufacturer's standard profile, with cork insert and runners for accessories; 1 inch wide overall , full width of frame.

D. Map Supports: Formed aluminum sliding hooks and roller brackets to fit map rail.

E. Temporary Protective Cover: Sheet polyethylene, 8 mil thick.

F. Flag Holders: Cast aluminum bored to receive 1 inch diameter flag staff, bracketed to fit top rail of board.

G. Cleaning Instruction Plate: Provide instructions for chalkboard cleaning on a metal plate fastened to perimeter frame near chalkrail.

H. Marker Tray: Aluminum, manufacturer's standard profile, one piece full length of markerboard, molded ends, concealed fasteners, same finish as frame.

I. Marker Tray: Wood; species and finish to match frame, style as indicated on drawings.

J. Mounting Brackets: Concealed.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that internal wall blocking is ready to receive work and positioning dimensions are as indicated on shop drawings.

C. Verify flat wall surface for frameless adhesive-applied boards.

3.2 PREPARATION

A. Acclimatize tackable wall panels by removing from packaging in installation area not less than 24 hours before application.

B. Remove switchplates, wall plates, and surface-mounted fixtures where tackable wall paneling is applied. Reinstall items on completion of installation.

C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install boards in accordance with manufacturer's instructions.

B. Install with top of marker tray at 30 inches above finished floor.

C. Secure units level and plumb.

D. Butt Joints: Install with tight hairline joints.

E. Carefully cut holes in boards for thermostats.

F. Install tackable wall panels in accordance with manufacturer's recommendations on specified substrates with concealed attachments.

1. Fabricate re-wrapped edges where partial panels about each other, or adjacent surfaces or trim.
2. Re-wrap top, bottom or side edges for cutting panels around door or window openings, abutting trim, protruding objects, and at other openings, including x-cut at receptacles, light switches, and other openings.
    a. Wrap minimum 2 inches around back of panel.
    b. Carefully cut fiber board, leaving vinyl wallcovering intact. Wrap wallcovering tightly around edge of board and adhere continuously around back of panel with manufacturer's recommended vinyl wallcovering adhesive.

3.4 CLEANING

A. Clean board surfaces in accordance with manufacturer's instructions.

B. Cover with protective cover, taped to frame.

C. Remove temporary protective cover at Date of Substantial Completion.

D. Break-in slate chalkboards with a chalk and clean treatment.

x

END OF SECTION 10 11 00

SECTION 10 14 00 - SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Room and door signs.
   2. Interior directional and informational signs.
   3. Luminous egress path marking and other "glow-in-the-dark" signs.
   4. Building identification signs.

B. Related Sections:
   1. Section 05 51 00 - Metal Stairs: Photoluminescent stair nosings.
   2. Section 05 52 00 - Metal Railings: Photoluminescent handrail strips.

1.2 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

B. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

C. ASTM E2072 - Standard Specification for Photoluminescent (Phosphorescent) Safety Markings; 2014.

D. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

E. NFPA 170 - Standard for Fire Safety and Emergency Symbols; 2021.

F. Texas Accessibility Standards (TAS) - 2012 Texas Accessibility Standards (TAS); 2012.

G. UL 1994 - Luminous Egress Path Marking Systems; Current Edition, Including All Revisions.

1.3 SUBMITTALS

A. Refer to Section 01 33 00 - Submittal Procedures, for submittal procedures.

B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.

C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
   1. When room numbers to appear on signs differ from those on Drawings, include the drawing room number on schedule.
   2. When content of signs is indicated to be determined later, request such information from Owner through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
   3. Submit for approval by Owner through Architect prior to fabrication.

D. Samples: Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.

E. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.

F. Verification Samples: Submit samples showing colors specified.

G. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

H. Manufacturer's Qualification Statement.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Package signs as required to prevent damage before installation.

B. Package room and door signs in sequential order of installation, labeled by floor or building.

C. Store tape adhesive at normal room temperature.

1.6 FIELD CONDITIONS

A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.

B. Maintain this minimum temperature during and after installation of signs.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
   1. Flat Signs:
      a. Best Sign Systems, Inc: www.bestsigns.com.
      b. Cosco Industries: www.coscoarchitecturalsigns.com.
      c. FASTSIGNS: www.fastsigns.com.
      d. Inpro: www.inprocorp.com.
      e. Mohawk Sign Systems, Inc: www.mohawksign.com.
   2. Dimensional Letter Signs:

B. Substitutions: Refer to section 01 25 00 - Substitution Procedures.
   1. Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution.

2.2 SIGNAGE APPLICATIONS

A. Accessibility Compliance: Signs are required to comply with ADA Standards and Texas Accessibility Standards (TAS) and ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.

B. Room and Door Signs: Provide a sign for every doorway, whether it has a door or not, not including corridors, lobbies, and similar open areas.
   1. Sign Type: Flat signs with engraved panel media as specified.
   2. Provide "tactile" signage, with letters raised minimum 1/32 inch and Grade II braille.
   3. Character Height: 1 inch.
   4. Sign Height: 2 inches, unless otherwise indicated.
   5. Office Doors: Identify with room numbers to be determined later, not the numbers indicated on drawings; in addition, provide "window" section for replaceable occupant name.
   6. Conference and Meeting Rooms: Identify with room numbers to be determined later, not the numbers indicated on drawings; in addition, provide "window" section with sliding "In Use/Vacant" indicator.
   7. Service Rooms: Identify with room names and numbers to be determined later, not those indicated on drawings.
   8. Rest Rooms: Identify with pictograms, the names "MEN" and "WOMEN", room numbers to be determined later, and braille.

C. Luminous Egress Path Marking and Other "Glow-in-the-Dark" Signs: Photoluminescent media.
   1. Provide luminous egress path marking as required by local authority having jurisdiction.
   2. Allow for total of 100 directional signs, approximately 6 inches square.
   3. Allow for 1000 linear feet of guidance strips.

4. Provide one numbered seat marker for each seat in auditorium and one numbered row marker for each row, each side of aisles.

D. Building Identification Signs:
   1. Use individual metal letters.
   2. Mount on outside wall in location indicated on Drawings.

E. Other Dimensional Letter Signs: Wall-mounted.
   1. Exterior: Allow for total of 50 letters, 6 inches high, metal.
   2. Interior: Allow for total of 50 letters, 6 inches high, metal.

2.3 SIGN TYPES

A. Flat Signs: Signage media without frame.
   1. Edges: Square.
   2. Corners: Square.
   3. Frame Finish: Natural (clear) anodized.
   4. Clear Cover: For customer produced sign media, provide clear cover of polycarbonate plastic, glossy on back, non-glare on front.
   5. Wall Mounting of One-Sided Signs: Tape adhesive.

B. Color and Font: Unless otherwise indicated:
   1. Character Font: Helvetica, Arial, or other sans serif font.
   2. Character Case: Upper case only.
   3. Background Color: Clear.
   4. Character Color: Contrasting color.

2.4 TACTILE SIGNAGE MEDIA

A. Engraved Panels: Laminated colored plastic; engraved through face to expose core as background color:
   1. Total Thickness: 1/16 inch.

B. Injection Molded Panels: One-piece acrylic plastic, with raised letters and braille.
   1. Total Thickness: 1/8 inch.

C. Applied Character Panels: Acrylic plastic base, with applied acrylic plastic letters and braille.
   1. Total Thickness: 1/8 inch.
   2. Letter Thickness: 1/8 inch.
   3. Letter Edges: Square.

2.5 DIMENSIONAL LETTERS

A. Metal Letters:
   1. Metal: Aluminum plate.
   2. Metal Thickness: 1/8 inch minimum.
   3. Letter Height: As indicated on Drawings.
   4. Text and Typeface:
      a. Character Font: Helvetica, Arial, or other sans serif font.
      b. Character Case: Upper case only.
   5. Finish: Brushed, satin.
   6. Mounting: Tape adhesive.

B. Plastic Letters:
   1. Material: Injection molded plastic.
   2. Color: As selected by Architect.
   3. Mounting: Tape adhesive.

2.6 ACCESSORIES

A. Concealed Screws: Stainless steel, galvanized steel, chrome plated, or other non-corroding metal.

B. Exposed Screws: Chrome plated.

C. Tape Adhesive: Double sided tape, permanent adhesive.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install neatly, with horizontal edges level.

C. Locate signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.

D. Protect from damage until Date of Substantial Completion; repair or replace damaged items.

END OF SECTION 10 14 00

SECTION 10 28 00 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Requirements including but not limited to:
   1. Washroom accessories.
   2. Toilet accessories.
   3. Shower room accessories.
   4. Childcare accessories.
   5. Custodial accessories.
   6. Accessories necessary for a complete installation.

1.2 REFERENCE STANDARDS

A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

B. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2024.

C. ASTM F446 - Standard Consumer Safety Specification for Grab Bars and Accessories Installed in the Bathing Area; 2019.

D. ASTM F2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use; 2022.

E. Texas Accessibility Standards (TAS) - 2012 Texas Accessibility Standards (TAS); 2012.

1.3 PERFORMANCE REQUIREMENTS

A. Grab Bars:
   1. Grab bars and any wall or other surfaces adjacent to grab bars shall be free of sharp or abrasive elements and shall have rounded edges. The space around the grab bars shall be as follows:

1.4 SUBMITTALS

A. Product Data: Technical Data including construction details, material descriptions, dimensions of individual components and profiles, and finishes.
   1. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
   2. Include electrical characteristics.

B. Samples: Provide a sample to demonstrate each exposed product finish specified.

C. Product Schedule: Show types, quantities, sizes, and installation locations by room of each accessory required. Identify locations using room designations indicated.

D. Maintenance Data: Submit for inclusion in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Accessibility Requirements: Comply with applicable requirements.
      a. Texas Accessibility Standards (TAS).

B. Source Limitations: Obtain products from single source from single manufacturer.

1.6 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.7 WARRANTY

A. Mirrors: Written warranty signed by manufacturer in which manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, visible silver spoilage defects.
   2. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.

B. Substitutions: Refer to section 01 25 00 - Substitution Procedures.
   1. Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution

2.2 MATERIALS

A. Stainless Steel: ASTM A666, Type 304, 0.031-inch (0.8-mm) minimum nominal thickness unless otherwise indicated

B. Mirrors: ASTM C1503, Mirror Glazing Quality, clear glass mirrors, nominal 6.0 mm thick

2.3 COMPONENTS

A. Underlavatory Guard: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.
   1. Material and Finish: Antimicrobial, molded plastic, white

2.4 FABRICATION

A. Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf (1112 N), when tested according to ASTM F446.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items. Remove temporary labels and protective coatings. Clean and polish exposed surfaces according to manufacturer's written recommendations.

PART 4 - SCHEDULE

4.1 TOILET ACCESSORY SCHEDULE

A. TA-1C - Soap Dispensers – Counter-Mounted:
   1. NOT USED.

B. TA-1W - Soap Dispensers – Wall-Mounted:
   1. Mounting: Surface.
   2. Basis of Design: Bobrick B-2111.
   3. Locations: Where indicated on Drawings.

C. TA-2 - Lavatory Mirrors, Typical:
   1. Mounting: Surface.
   2. Basis of Design: Bobrick B-290.
   3. Size: 24 inches by 36 inches.
   4. Location: At each lavatory.

D. TA-2F - Full-Length Mirrors:
   1. Mounting: Surface.
   2. Basis of Design: Bobrick B-290.
   3. Size: 24 inches by 72 inches.
   4. Location: Where indicated on Drawings.

E. TA-3 - Toilet Paper Dispensers:
   1. Mounting: Surface.
   2. Basis of Design: Bobrick B-265.
   3. Locations: At each water closet.

F. TA-4 - Paper Towel Dispensers:
   1. Mounting: Surface.
   2. Basis of Design: Bobrick B-262.
   3. Locations: Where indicated on Drawings.

G. TA-5 - Grab Bars: (At Wheelchair-Accessible Water Closets):
   1. Size/Finish: 1-1/2 inch diameter satin stainless steel.
   2. Basis of Design: Bobrick B-6806.
   3. Mounting: Attach with concealed mounting kit. Mount parallel to floor.
   4. Location: At each wheelchair-accessible water closet.

H. TA-6 - Sanitary Napkin Dispensers:
   1. Mounting: Surface.
   2. Basis of Design: Bobrick B-2706.
   3. Operation: Single coin / Double coin - (25/50 cents).
   4. Capacity: 20 Napkins/ 30 Tampons.
   5. Locations: At each women’s toilet room.

I. TA-7 - Sanitary Napkin Disposal:
   1. Mounting: Surface.
   2. Basis of Design: Bobrick B-270.
   3. Locations: Where indicated on Drawings.

J. TA-8 - Shelf with Mop and Broom Holders and Hooks:
   1. Mounting: Surface.
   2. Model No.: B-239 x 34.
   3. Capacity: Four hooks, three mop holders.
   4. Locations: Mop sink at each custodial rooms.

K. TA-9 - Grab Bars: (At Accessible Shower):
   1. Mounting: Surface.
   2. Basis of Design: Bobrick B-6861 modified (24 x 16).
   3. Locations: At each accessible shower stall.

L. TA-10A - Folding Benches: Adult Height:
   1. Mounting: Surface, reversible.
   2. Basis of Design: Bobrick B-5181.
   3. Locations: Where indicated on Drawings.

M. TA-10C - Folding Benches, Child Height (15 inch seat height):
   1. NOT USED.

N. TA-11 - Clothing Hook:
   1. Mounting: Surface.
   2. Basis of Design: Bobrick B-6717.
   3. Locations: All shower locations.
   4. Toilet and Shower Partitions: If toilet and shower partitions are utilized, hooks are to be provided by the partition manufacturer(s) as part of their hardware package.

O. TA-12 - Shower Curtains, Rods and Hooks:
   1. Basis of Design:
      a. Rods: Bobrick B-6107 (36 inches or as indicated).
      b. Curtains: Bobrick B-204-2 (42 inches x 72 inches or as required).
      c. Hooks: Bobrick B-204-1.
   2. Mounting/Locations: Where indicated on Drawings.

P. TA-13 - Electric Hand Dryers:
   1. NOT USED.

Q. TA-14 - Paper Towel Dispenser/Trash Receptacle Combination:
   1. Mounting: Surface.
   2. Basis of Design: Bobrick B-3949.
   3. Locations: Where indicated on Drawings.

R. TA-15 - Grab Bars: (At Ambulatory-Accessible Toilet Compartments):
   1. Size/Finish: 1-1/2 inch diameter satin stainless steel, lengths as indicated in drawings.
   2. Basis of Design: Bobrick B-6806.
   3. Mounting: Attach with concealed mounting. Mount parallel to floor.
   4. Location: At each ambulatory-accessible toilet compartment.

S. TA-16 - Child Changing Station:
   1. Type: Horizontal station to accommodate infants and toddlers.
   2. Basis of Design:
      a. Model KB200 manufactured by Koala Kare Products, a division of Bobrick.
   3. General Requirements:
      a. Comply with applicable accessibility and regulatory requirements..
      b. Comply with with ASTM F2285.
      c. Provide universal instruction graphics and safety messages in multiple languages.
      d. Provide replacable restraining straps.
   4. Construction and Features:
      a. Dimensions: 35 inches long by 22 inches high by 4 inches deep.
      b. FDA approved injection molded polypropylene with steel on steel hinge system. Fabricate to withstand static loads over 400 pounds.
      c. Child protection straps with snap lock fasteners.
      d. Built-in diaper bag hooks.
      e. Built-in sanitary liner dispensers; 3 ply, biodegradable.
      f. Premium gas spring mechanism.
      g. Molded usage and safety instructions in six languages and Braille.
      h. Comply with applicable accessibility regulations.
      i. Antifungal to comply with ASTM standards.
   5. Color: As selected by Architect from manufacturer's full line.
   6. Finish: Manufacturer's standard stainless steel.
   7. Location: Where indicated on Drawings.

T. TA-16A - Adult Changing Station:
   1. NOT USED.

U. TA-17R - Trash Receptacle, Recessed:
   1. Mounting: Recessed.
   2. Basis of Design: Bobrick B-3644.
   3. Locations: As indicated on Drawings.

V. TA-17U - Trash Receptacle Undercounter:
   1. NOT USED.

W. TA-18 - Vertical Grab Bar:
   1. Mounting: Surface.
   2. Basis of Design: Bobrick B-6806x18.
   3. Locations: As indicated on Drawings.

X. TA-19 – Water Closet Cover Dispenser:
   1. Mounting: Recessed.
   2. Basis of Design: Bobrick B-301.
   3. Locations: At each water closet.

Y. TA-20 - Folding Utility Shelf:
   1. Mounting: Surface.
   2. Basis of Design: Bobrick B-287.
   3. Locations: At each toilet compartment.

Z. TA-21 - Hand Sanitizer:
   1. Mounting: Surface.
   2. Basis of Design: Bradley Model 6A02-11.
   3. Locations: As indicated on Drawings.

END OF SECTION 10 28 00

SECTION 10 43 00 - EMERGENCY AID SPECIALTIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Automated external defibrillators (AEDs).

B. Automated external defibrillator (AED) cabinets.

C. Emergency oxygen tank cabinets.

D. AED and emergency oxygen tank cabinets.

E. First aid cabinets.

F. Bleeding control cabinets.

G. Key boxes.

H. Accessories.

1.2 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.

B. Section 09 90 00 - Painting and Coating: Field paint finish.

1.3 DEFINITIONS

A. Automated External Defibrillator (AED): A Food and Drug Administration (FDA)-approved portable device, which automatically analyzes the heart rhythm and recognizes the presence of ventricular fibrillation and/or tachycardia. If defibrillation is warranted, the AED automatically charges and prompts (visual and/or audio) the operator to deliver an electrical shock.

1.4 REFERENCE STANDARDS

A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a (Reapproved 2017).

1.5 SUBMITTALS

A. Refer to Section 01 33 00 - Submittal Procedures for submittal procedures.

B. Product Data: Provide AED operational features, color and finish, anchorage details, and installation instructions.

C. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.

D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Maintenance Data: Include test schedules and recertification requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers listed whose products meet or exceed the specifications are approved for use in the Work. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.

1. Automated External Defibrillators (AEDs):
    a. Philips Medical Systems: www.usa.philips.com.
    b. Stryker Corporation: www.stryker.com.
    c. ZOLL Medical Corporation: www.zoll.com.
2. Emergency Aid Cabinets and Accessories:

a. Activar Construction Products Group, Inc. - JL Industries; LifeStart 1400 Series AED Cabinet: www.activarcpg.com/#sle.
b. Modern Metal Products, a division of Technico, Inc: www.modern-metal.com/#sle.

3. Key Boxes:
   a. Knox Company: www.knoxbox.com/#sle.
4. AED Floor Signs:
   a. Brimar Industries, Inc: www.brimar.com/#sle.
   b. Insite Solutions, LLC: www.stop-painting.com/#sle.
5. AED Floor Marking Kits:
   a. Insite Solutions, LLC: www.stop-painting.com/#sle.

2.2 AUTOMATED EXTERNAL DEFIBRILLATORS (AEDS)

A. Automated External Defibrillators (AEDs) - General: FDA approval required.
   1. Provide automated external defibrillators (AEDs) as indicated.
      a. Basis of Design:
         1) HeartSine samaritan PAD 350P Defibrillator - PAD 350p manufactured by Stryker Corporation.

2.3 EMERGENCY AID CABINETS

A. Type: Automated external defibrillator (AED).

B. Cabinet Construction: Non-fire-rated.

C. Fire-Rated Cabinet Construction: One-hour fire rated.
   1. Steel; double wall or outer and inner boxes with 5/8 inch thick fire barrier material.
   2. Fire Rating: Listed and labeled in accordance with ASTM E814 requirements for fire resistance rating of walls where being installed.

D. Cabinet Configuration: Recessed, Semi-recessed, or Surface-mounted type as indicated on Drawings.
   1. Size each cabinet to accommodate AED or first aid kit as indicated on Drawings.
   2. Trim:
   3. Provide cabinet enclosure with right angle inside corners and seams, and with formed perimeter trim and door stiles.

E. Door: 0.036 inch metal thickness, reinforced for flatness and rigidity with wire pull handle and nylon catch. Hinge door for 180 degree opening with two butt hinges.

F. Cabinet Mounting Hardware: Appropriate to cabinet, with predrilled holes for placement of anchors.

G. Fabrication: Weld, fill, and grind components smooth.

H. Finish of Cabinet Exterior Trim and Door: No.4 - Brushed stainless steel.

I. Finish of Door Pull or Handle: Stainless steel.

J. Finish of Cabinet Interior: White powder coat.

2.4 KEY BOXES

A. Basis of Design: 3200 Series manufactured by Knox Company.

B. Mounting: Fully-recessed, as indicated on drawings. Surface mounted units are not acceptable.

C. Finish: Aluminum.

2.5 ACCESSORIES

A. Alarm Contacts: Contact devices.
   1. Magnetic door contact for existing alarm systems.

B. Cabinet Door Signage: "AED" decal, as required, or vinyl self-adhering, prespaced black lettering and identifying graphic in accordance with authorities having jurisdiction (AHJ).

C. Plastic Wall Signage: Flat style.

D. AED and Oxygen Floor Signs:
   1. Floor Sign: 17-1/2 inch diameter vinyl sign with "AED OXYGEN" and AED icon.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify rough openings for cabinet are correctly sized and located.

3.2 INSTALLATION

A. AED Installation:
   1. Install in accordance with manufacturer's instructions.

B. Wall Signs:
   1. Location: Where indicated on Drawings.
   2. Apply on walls after field painting is completed and has been accepted.

C. Cabinet Lettering:
   1. Location: Face of door framing.

D. Key Box Installation:
   1. Install in accordance with manufacturer's instructions.
   2. Location: As indicated on Drawings or as directed by Authorities Having Jurisdiction (AHJ).

3.3 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust doors to operate smoothly without binding.

C. On completion of installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes. Replace products that cannot be restored to factory-finished appearance. Use materials and procedures recommended by cabinet manufacturer.

3.4 CLOSEOUT ACTIVITIES

A. Refer to Section 01 77 00 - Closeout Procedures and checklist for closeout submittals.

B. Refer to Section 01 79 00 - Demonstration and Training for additional requirements.

END OF SECTION 10 43 00

SECTION 10 44 00 - FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Fire extinguishers.
   2. Fire extinguisher cabinets.
   3. Accessories.

B. Related Sections:
   1. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.
   2. Section 09 90 00 - Painting and Coating: Field paint finish.

1.2 REFERENCE STANDARDS

A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a (Reapproved 2017).

B. FM (AG) - FM Approval Guide; Current Edition.

C. NFPA 10 - Standard for Portable Fire Extinguishers; 2022.

D. UL (DIR) - Online Certifications Directory; Current Edition.

1.3 SUBMITTALS

A. Refer to Section 01 33 00 - Submittal Procedures for submittal procedures.

B. Product Data: Provide extinguisher operational features, extinguisher ratings and classifications, color and finish, anchorage details, and installation instructions.

C. Shop Drawings: Indicate locations of cabinets, cabinet physical dimensions, rough-in measurements for recessed cabinets, locations of individual fire extinquishers, mounting measurements for wall bracket, installation procedures, and accessories required for complete installation.

D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.4 FIELD CONDITIONS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers listed whose products meet or exceed the specifications are approved for use in the Work. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.
   1. Fire Extinguishers:
      a. Ansul, a brand of Tyco Fire Protection Products, a division of Johnson Controls International: www.ansul.com/#sle.
      b. JL Industries, an Activar Construction Products Group, Inc. brand: www.activarcpg.com/#sle.
      c. Kidde, a unit of United Technologies Corp: www.kidde.com/#sle.
      d. Nystrom, Inc: www.nystrom.com/#sle.
      e. Oval Fire Products: www.ovalfireproducts.com/#sle.

f. Potter-Roemer, a member of Morris Group International: www.potterroemer.com/#sle.
g. Pyro-Chem, a division of Johnson Controls International: www.pyrochem.com/#sle.

2. Fire Extinguisher Cabinets and Accessories:
   a. JL Industries, an Activar Construction Products Group, Inc. brand: www.activarcpg.com/#sle.
   b. Kidde, a unit of United Technologies Corp: www.kidde.com/#sle.
   c. Larsen's Manufacturing Co., a member of Morris Group International: www.larsensmfg.com/#sle.
   d. Nystrom, Inc: www.nystrom.com/#sle.
   e. Oval Fire Products: www.ovalfireproducts.com/#sle.
   f. Potter-Roemer, a member of Morris Group International: www.potterroemer.com/#sle.

B. Substitutions: Refer to section 01 25 00 - Substitution Procedures.

2.2 FIRE EXTINGUISHERS

A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
   1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.

2.3 FIRE EXTINGUISHER CABINETS

A. General:
   1. Size to accommodate indicated extinguisher and accessories.
   2. Doors:
      a. Door Glazing: Acrylic plastic, clear, 1/8 inch thick, flat shape and set in resilient channel glazing gasket.
   3. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.
   4. Fabrication: Weld, fill, and grind components smooth.
   5. Finish of Cabinet Exterior Trim and Door: No.4 - Brushed stainless steel.
   6. Finish of Cabinet Interior: White enamel.

B. Standard Cabinet Construction:
   1. Non-fire-resistance-rated.
   2. Formed primed steel sheet; 0.036 inch thick base metal.

C. Cabinet Configuration: Partially-Recessed.

2.4 ACCESSORIES

A. Extinguisher Brackets: Formed steel, chrome-plated.

B. Extinguisher Theft Alarm: Battery operated alarm, 10 second delay for disarming, activated by opening cabinet door.
   1. Location(s): Provide at each fire extinguisher cabinet

C. Cabinet Signage: .
   1. Lettering: “FIRE EXTINGUISHER” decal, or vinyl self-adhering, pre-spaced black lettering in accordance with authorities having jurisdiction (AHJ).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify rough openings for cabinet are correctly sized and located.

3.2 INSTALLATION

A. Locate as indicated on Drawings, as directed by the Owner, and as follows:

1. Provide one Multipurpose Fire Extinguisher with wall bracket in each of the following locations:
    a. Mechanical Rooms.
    b. Electrical Rooms.
    c. MDF/IDF/Telecommunications Rooms.
    d. Fire Riser Rooms.
    e. Auditoriums of 4000 square feet or less.

B. Install in accordance with manufacturer's instructions.

C. Install cabinets plumb and level in wall openings, such that it complies with accessibility requirements.

D. Secure rigidly in place.

E. Place extinguishers in cabinets.

3.3 MAINTENANCE

A. Refer to Section 01 77 00 - Closeout Procedures and Checklist for additional requirements relating to maintenance service.

B. Provide a separate maintenance contract for specified maintenance service.

END OF SECTION 10 44 00

SECTION 10 51 13 - METAL LOCKERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Metal lockers.

1.2 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Concrete base construction.

B. Section 06 10 00 - Rough Carpentry: Wood base construction, Blocking and Nailers.

C. Section 06 20 00 - Finish Carpentry: Bench tops for locker bench support brackets.

1.3 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2023a.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

D. ASTM A879/A879M - Standard Specification for Steel Sheet, Zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface; 2022.

E. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2023, with Editorial Revision.

F. ASTM F1267 - Standard Specification for Metal, Expanded, Steel; 2018 (Reapproved 2023).

G. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.4 SUBMITTALS

A. Refer to Section 01 33 00 - Submittal Procedures for submittal procedures.

B. Product Data: Manufacturer's published data on locker construction, sizes, and accessories.
   1. Wired Access Control: Include power requirements and standard wiring diagrams for specified products.

C. Shop Drawings: Indicate locker plan layout, numbering plan and combination lock code.
   1. Wired Access Control: Provide schematic system riser diagram indicating component interconnections. Include requirements for interface with other systems.

D. Full Size Sample: One full-size locker of each construction specified for evaluation of construction.

E. Samples: Submit two samples 2 inches by 2 inches in size showing color and finish of metal locker material.

F. Manufacturer's Installation Instructions: Indicate component installation assembly.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect locker finish and adjacent surfaces from damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
   1. Art Metal Products: www.artmetalproducts.com.
   2. ASI Storage Solutions: www.asi-storage.com.
   3. DeBourgh Manufacturing Co: www.debourgh.com.

4. List Industries, Inc: www.listindustries.com.
5. Lockers MFG: www.lockersmfg.com.
6. Lyon Workspace Products: www.lyonworkspace.com.
7. Republic Storage Systems Co: www.republicstorage.com.
8. Tennsco Storage: www.tennsco.com.

B. Substitutions: Refer to section 01 25 00 - Substitution Procedures.
1. Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution.

2.2 LOCKER APPLICATIONS

A. Lockers: Metal lockers
1. Basis of Design: Superior manufactured by List Industries.
2. Width: 24 inches.
3. Depth: 30 Inches.
4. Height: 72 inches.
5. Configuration: Two tier.
6. Fittings: Size and configuration as indicated on drawings.
   a. Coat rod.
   b. Hooks: One single prong.
7. Ventilation: Louvers at top and bottom of door panel.
8. Locking: Padlock hasps, for padlocks provided by Owner.
   a. Locking Action: Positive, automatic type, whereby locker may be locked when open, then closed without unlocking.
9. Color: To be selected from manufacturer's full range by Architect.

2.3 METAL LOCKERS

A. Accessibility: Design units indicated on drawings as 'accessible' to comply with ICC A117.1 and TAS 2012.

B. Locker Case Construction:
1. Heavy-Duty, Welded Construction: Made of formed and welded together sheet steel; metal edges finished smooth without burrs; baked enamel or powder coat finished inside and out.
   a. Assembly: Do not use bolts, screws, or rivets to assemble locker bodies.
   b. Locker Body Components: Formed and flanged from steel sheet of the following type and minimum thicknesses:
      1) Unperforated Steel Sheet: Commercial Steel (CS), Type B, supplied for exposed applications and complying with ASTM A1008/A1008M and the following:
         (a) Uncoated.
         (b) Zinc-Coated by the Hot-Dip Process: Comply with ASTM A653/A653M, coating designation G60/Z180.
         (c) Zinc-Iron-Alloy-Coated by the Hot-Dip Process: Comply with ASTM A653/A653M, coating designation A40/ZF120.
         (d) Zinc-Coated by the Electrolytic Process: Comply with ASTM A879/A879M, coating designation 30Z.
         (e) Perforations: Manufacturer's standard pattern of square holes.
      2) Expanded Steel Sheet: Made from ASTM A1008/A1008M carbon steel sheet and complying with ASTM F1267, Type II, expanded and flattened, style 3/4 - 16 , with a minimum 70 percent open area.
         (a) Class 1, uncoated.
         (b) Class 2, hot-dip zinc-coated, galvanized or galvannealed.
      3) Body and Shelves: 16 gauge, 0.0598 inch.
      4) Backs: 18 gauge, 0.0478 inch.
      5) Base: 18 gauge, 0.0478 inch.

(a) Height: 4 inches.

6) Legs: Manufacturer's standard
   (a) Form by extending frame members.
   (b) Fabricate from 14 gauge, 0.0747 inch nominal thickness steel sheet specified above, welded to bottom of locker.
   (c) Height: 6 inches.

c. Frames: Formed channel shape, welded and ground flush, welded to body, resilient gaskets and latching for quiet operation.
   1) Door Frame: 16 gauge, 0.0598 inch, minimum.

d. Where ends or sides are exposed, provide flush panel closures.

e. Provide filler strips where indicated or required, securely attached to lockers.

C. Latches and Door Handles: Manufacturer's standard.
   1. Latching Components: 300 Series Stainless Steel (ASTM A240/A240M).
   2. Latching: Manufacturer's standard for locking arrangement selected.
      a. Three-Point Lift Handle Gravity Latch: Pocket-mounted, provide for doors 18 inches or taller.
         1) Handle Pocket, Recess: Stainless steel flush-mounted cup recessed into face of door.
         2) Handle: Steel finger lift mechanism with exposed portion encased in molded plastic trigger.
            (a) Padlock Eye: Integral with lift trigger, sized for use with 9/32 inch diameter padlock shackles.
         3) Latching Mechanism: Spring activated nylon slide latch enclosed in steel latch channel allows closing of door while padlock or built-in lock is in position.
         4) Lock Hole Filler Plate: Manufacturer's standard. Provide for lockers intended to be unsecured or secured with padlocks.
         5) Rubber bumpers riveted to door stops for silent operation.

D. Cup, Pocket: Manufacturer's standard, with integral pull, and recessed surface punched for installation of lock, latch lift mechanism, and number plate.

E. Hinges: Continuous piano hinge with powder coat finish to match locker color.

F. Trim: 20 gauge, 0.0359 inch.

G. Coat Hooks: Stainless steel or zinc-plated steel.

H. Number Plates: Provide oval shaped aluminum plates. Form numbers 1/2 inch high of block font style with ADA designation, in contrasting color.

I. Locker Groups: Gang lockers in groups of two and assemble in factory for shipment as a single unit.

2.4 LOCKER BENCHES

A. Locker Bench Support Brackets: Welded structural aluminum single arm floor mount pedestal bench support brackets; pre-drilled for bench top material attachment and for wall anchorage.
   1. Accessibility: Comply with ICC A117.1 and ADA Standards.
   2. Dimensions: Refer to Drawings.
   3. Load Capacity per Bracket: 400 pounds.
   4. Finish: Clear anodized.
   5. Bracket Spacing: 36 inches on center, maximum. Project-specific spacing to be determined based on field measurements.
   6. Bracket-to-Wall Attachment: Fasteners/anchors recommended by bracket manufacturer for wall construction conditions encountered.
   7. Products:
      a. Rakks/Rangine Corporation; Bench Support Brackets: http://www.rakks.com/#sle.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that prepared bases are in correct position and configuration.

B. Verify bases and embedded anchors are properly sized.

C. Verify that power and ethernet are installed and enabled. See manufacturer drawings for recommended outlet or junction box placement.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Place and secure on prepared base.

C. Install lockers plumb and square.

D. Secure lockers with anchor devices to suit substrate materials. Minimum Pullout Force: 100 pounds.

E. Bolt adjoining locker units together to provide rigid installation.

F. Install end panels, filler panels, and sloped tops.

G. Install fittings if not factory installed.

H. Replace components that do not operate smoothly.

3.3 CLEANING

A. Clean locker interiors and exterior surfaces.

END OF SECTION 10 51 13

SECTION 10 56 13 - METAL STORAGE SHELVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: Requirements including but not limited to:
   1. Metal storage shelving.
   2. Accessories necessary for a complete installation.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design metal storage shelving, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Seismic Performance: Metal storage shelving shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1.4 SUBMITTALS

A. Product Data: Technical data for each type of shelving unit and accessory components including recessed tracks. Include rated capacities, installation and construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Submit plans, elevations, sections, and details, including installation details of connectors, lateral bracing, and special bracing.

C. Seismic Qualification Certificates: For metal storage shelving, accessories, and components, from manufacturer.

1.5 COORDINATION

A. Coordinate sizes and locations of blocking and backing required for installation of metal storage shelving attached to wall and ceiling assemblies.

B. Coordinate locations and installation of metal storage shelving that may interfere with ceiling systems including lighting, HVAC, speakers, sprinklers, access panels, electrical switches or outlets, and floor drains.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install metal storage shelving until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at levels intended for building occupants during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Hot Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

B. Cold Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

C. Metallic Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with G60 (Z180) zinc (galvanized) or A60 (ZF180) zinc-iron-alloy (galvannealed) coating.

D. Steel Tubing: ASTM A 513, Type 2-A.

2.2 STORAGE SHELVING UNITS

A. Heavy Duty Metal Storage Shelving:
   1. Basis of Design: Heavy Duty - Clipper Quick Shelving System as manufactured by Penco. Other approved manufacturers are as listed below:
      a. Republic Steel.
      b. Lyon Metal Products.
      c. Inca.
      d. Interlake.
   2. Load Carrying Capacity per Shelf: Minimum 760 pounds uniformly distributed.
   3. Posts: All posts shall be punched for clip or nut and bolt construction. Shelves and accessories are to be vertically adjustable on 1" centers. Side sway braces or side panels to be attached to the side flange of the post. Bolts, nuts, and sway braces or panels shall not obstruct the full adjustability of the shelves.
   4. Box Post: Box post to be roll formed and have overall dimensions of 3/4" wide x 2-7/16" deep. Box post to be flush within 1/4" of the face of the shelves when assembled.
   5. Truss Type Wire Shelves: Steel or stainless-steel wire over wire construction, with downturned wire truss edges; with standard post collar, designed to engage collet (wedge), welded at each corner.
   6. Side Panels: 24 gauge steel. Each side punched with holes for bolting to posts.
   7. Backs: 24 gauge steel with holes on each side for bolting to angle posts and in the middle using a back panel clip.
   8. Overall Unit Width: 48 inches inclusive of two end posts.
   9. Overall Unit Depth: Refer to Drawings.
   10. Overall Unit Height: Refer to Drawings.
   11. Base Strip: 18 gauge steel attached to face of shelf with bolts and nuts to close space between the bottom of the shelf and the floor.
   12. Foot Plates: 13 gauge zinc plated steel.
   13. Steel Finish: Except for stainless steel, baked enamel or powder coat.
      a. Color and Gloss: As selected by Architect from manufacturer’s full range of colors.

2.3 ANCHORS

A. Floor Anchors: Galvanized steel, post installed expansion anchors or power actuated fasteners. Provide number per unit recommended by manufacturer unless additional anchors are indicated in calculations.

B. Wall Anchors: Galvanized steel anchors designed to secure metal storage shelving to adjacent wall. Provide one per shelving unit for each shelving unit adjacent to a wall unless additional anchors are indicated in calculations.

2.4 FABRICATION

A. Fabricate metal storage shelving components according to manufacturer's installation instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas for compliance with requirements for installation tolerances and other conditions affecting performance of the work. Examine floors for suitable conditions where metal storage shelving will be installed.

B. Examine walls and ceilings to which metal storage shelving will be attached for properly located blocking, grounds, or other solid backing for attachment of support fasteners.

C. Proceed with installation after correcting unsatisfactory conditions.

3.2 PREPARATION

A. Vacuum and clean finished floor over which metal storage shelving is to be installed.

3.3 INSTALLATION

A. Install metal storage shelving level, plumb, square, rigid, true, and with shelves flat and free of dents or distortion. Make connections to form a rigid structure, free of buckling and warping.
   1. Install exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.
   2. Install braces, straps, plates, brackets, and other reinforcements as needed to support shelf loading and as required for stability.
   3. Adjust post base bolt leveler to achieve level and plumb installation.
   4. Anchor shelving units to floor with floor anchors through floor plate. Shim floor plate to achieve level and plumb installation.
   5. Install seismic restraints.
   6. Connect side to side and back to back shelving units together.
   7. Install shelves in each shelving unit at spacing indicated on Drawings.
      a. Case Type Metal Storage Shelving: Install adjustable shelf clips at front and back of each shelf.
      b. Four Post Metal Storage Shelving: Install four clips, one at each post, for support of each shelf; with clips fully engaged in post perforations.
      c. Post and Beam Metal Storage Shelving: Install beams with beam to post connectors fully engaged in post perforations.

3.4 ERECTION TOLERANCES

A. Erect metal storage shelving to a maximum tolerance from vertical of 1/2 inch in up to 10 feet of height, not exceeding 1 inch for heights taller than 10 feet.

B. Erect post and beam metal storage shelving to a maximum tolerance from vertical of 1/4 inch in 84 inches of height.

3.5 ADJUSTING

A. Adjust metal storage shelving so that connectors and other components engage accurately and securely.

B. Adjust and lubricate operable components to operate smoothly and easily, without binding or warping. Check and readjust operating hardware.

C. Touch up marred finishes or replace metal storage shelving that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by metal storage shelving manufacturer.

D. Replace metal storage shelving components that have been damaged beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10 56 13

SECTION 10 56 17 - WALL-MOUNTED STANDARDS AND SHELVING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Steel shelf standards, brackets, and accessories.

B. Aluminum shelf standards, brackets, and accessories.

C. Steel shelf support brackets.

D. Closet rods for mounting on brackets.

E. Shelves.

1.2 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Wood blocking in walls for attachment of standards.

B. Section 06 20 00 - Finish Carpentry: Wood shelves.

C. Section 09 21 16 - Gypsum Board Assemblies: Blocking in metal stud walls for attachment of standards.

1.3 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.

B. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

C. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

E. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

F. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

G. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

1.4 SUBMITTALS

A. Refer to Section01 33 00 - Submittal Procedures for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used.

C. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Refer to Section 01 77 00 - Closeout Procedures and Checklist for additional provisions.
   2. Extra Brackets: Ten of each size of standard straight bracket.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products under cover and elevated above grade.

B. Store products in manufacturer's unopened packaging until ready for installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers listed whose products meet or exceed the specifications are approved for use in the Work. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.
   1. Steel Shelf Standards and Brackets:
   2. Aluminum Shelf Standards, Brackets, and Accessories:
   3. Steel Shelf Support Brackets:
   4. Shelving:
      a. Rakks/Rangine Corporation; Aluminum Shelving: www.rakks.com/#sle.

B. Substitutions: Refer to section 01 25 00 - Substitution Procedures.

2.2 COMPONENTS

A. Steel Shelf Standards, Brackets, and Accessories:
   1. Heavy-Duty Shelf Standards and Brackets: Single-slotted channel standards for brackets adjustable in 1 inch increments along entire length of standard, drilled and countersunk for screws.
      a. Basis of Design Product: E-Z Shelving Systems.
      b. Load Capacity: Recommended by manufacturer for loading of 465 pounds per pair of standards.
      c. Lengths: 48 inches
      d. Finish: Powder-coated.
      e. Color: To be selected by Architect from manufacturer's full line.
      f. Brackets: Double tab type, locking into slots; size to suit shelves; same finish as standards.
      g. Provide snap-in cover strips to hide unused slots and screw holes.
      h. Application: Use decorative heavy duty standards.
      i. Bracket Quantity: Provide one bracket for each 48 inches of standard length.
   2. Shelf Standard Accessories:
      a. At shelves indicated as sloping provide adjustable slant brackets.
      b. Where cornices are indicated as part of shelving provide cornice brackets.
      c. Where shelves are indicated to be fastened to brackets provide brackets with flanges for screwing into end of shelf, steel shelf rests, or flanged brackets; fasten with screws.
      d. Provide other accessories as indicated.
   3. Closet Rods: Steel tubing for wall mounting in flange fittings.
      a. Length: As required for application, up to 12 feet.
      b. Provide mounting fittings to suit application.

B. Aluminum Shelf Standards, Brackets, and Accessories:
   1. Aluminum Components: ASTM B221 (ASTM B221M), alloy 6063, temper as indicated, with anodized finish complying with to AAMA 611, or powder coating complying with AAMA 2603 or AAMA 2604 for select colors.
   2. Wall-Mounted Shelf Standards: Channel type extruded aluminum standards mounted on walls and designed to hold shelf support brackets inserted into channel ends or access slots and slid to desired position.
      a. Material: Extruded aluminum, ASTM B221 6063-T6 alloy and temper.
      b. Lengths: As indicated on drawings.
      c. Manufacturer/Profile No: .
      d. Mounting: Surface.
      e. Accessories: Provide access slots and channel covers.

C. Steel Shelf Support Brackets:

1. Material: Steel, ASTM A36/A36M.
2. Bracket Type: L-shaped, with gusset, with predrilled mounting holes on vertical leg for attachment to wood stud or blocking.
3. Bracket Horizontal Support Length: As indicated on drawings.
4. Bracket Thickness: As indicated on drawings.
5. Finish: As selected by Architect from manufacturer's full line.
6. Bracket Quantity: Provide a bracket 6 inches from each end and one support bracket for each 24 inches of shelf length between end brackets.

D. Shelves:
1. Aluminum Shelves: Extruded aluminum sections with textured flat top and bottom ribs; ASTM B221 6063-T5 alloy and temper; finished on all surfaces.
   a. Shelf Capacity: Uniform distributed load of 100 psf, minimum.
   b. Shelf Deflection: 1/4 inch in 36 inches, maximum, under specified uniform load.
   c. Shelf Thickness: 6/10 inch.
   d. Shelf Length: As indicated on drawings.
   e. Shelf Depth: As indicated on Drawings.
   f. Accessories: Provide shelf lip brackets, shelf hold-down clips, shelf splines, label holders, shelf end caps, sliding book ends, and shelf bridge clips.
2. Laminate Faced Shelves: Particleboard or medium density fiberboard covered with high pressure decorative laminate on both sides.
   a. Edge Finish: Matching laminate, all four edges.
   b. Substrate Thickness: 3/4 inch, nominal.
   c. Length: As indicated on drawings.
   d. Laminate: NEMA LD 3 Type HGL.
   e. At slanted shelves, provide lip extending 1 inch above top surface, constructed of same materials; glued and screwed into shelf edge.
   f. Shelf Quantity: Provide one shelf for each 12 inches of length of standard, per pair of standards, unless otherwise indicated.

E. Fasteners: Screws as recommended by manufacturer for intended application or as otherwise required by project conditions. Finish of exposed to view fasteners to match finish of standards and other components.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Mount standards or brackets to solid backing capable of supporting intended loads.

C. Install brackets, shelving, and accessories.

D. Provide double sided foam tape between adjoining sections of aluminum shelving to maintain alignment.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 10 56 17

SECTION 11 30 13 - RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Laundry appliances.

B. Related Sections:
   1. Division 22 - Plumbing: Plumbing connections for appliances.
   2. Division 23 - Mechanical: Exhaust connections for appliances.
   3. Division 26 - Electrical: Electrical connections for appliances.

1.2 REFERENCE STANDARDS

A. UL (DIR) - Online Certifications Directory; Current Edition.

1.3 SUBMITTALS

A. Refer to Section 01 33 00 - Submittal Procedures for submittal procedures.

B. Product Data: Manufacturer's data indicating dimensions, capacity, and operating features of each piece of residential equipment specified.

C. Copies of Warranties: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

B. Electric Appliances: Listed and labeled by UL (DIR) and complying with NEMA Standards (National Electrical Manufacturers Association).

C. Gas Appliances: Bearing design certification seal of American Gas Association (AGA).

1.5 WARRANTY

A. See Section 01 77 00 - Closeout Procedures and Checklist, for additional warranty requirements.

B. Provide five (5) year manufacturer warranty on refrigeration system of refrigerators.

C. Provide ten (10) year manufacturer warranty on magnetron tube of microwave ovens.

D. Provide ten (10) year manufacturer warranty on tub and door liner of dishwashers.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
   1. Frigidaire Home Products: www.frigidaire.com.
   2. GE Appliances: www.geappliances.com.
   3. LG Electronics: www.lg.com/us/kitchen-appliances.
   4. Whirlpool Corp: www.whirlpool.com.

B. Substitutions: Refer to section 01 25 00 - Substitution Procedures.
   1. Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution.

2.2 LAUNDRY APPLIANCES

A. Provide Equipment Eligible for Energy Star Rating: Energy Star Rated.

B. Clothes Washer: Top-loading stationary.

1. Size: Large capacity.
2. Controls: Solid state electronic.
3. Cycles: Include normal, permanent press, delicate, soak, and automatic soak.
4. Motor Speed: Single-speed.
5. Features: Include optional second rinse, bleach dispenser, fabric softener dispenser, self-cleaning lint filter, sound insulation, and end of cycle signal.
6. Finish: Painted steel, color as selected by Architect from manufacturer's full line.

C. Clothes Dryer: Electric, stationary.
1. Basis of Design: _____ manufactured by Frigidaire Home Products.
2. Size: Large capacity.
3. Controls: Solid state electronic, with electronic moisture-sensing dry control.
4. Temperature Selections: One.
5. Cycles: Include normal, permanent press, knit/delicate, and air only.
6. Features: Include interior light, reversible door, stationary rack, sound insulation, and end of cycle signal.
7. Finish: Painted steel, color as selected by Architect from manufacturer's full line.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify utility rough-ins are provided and correctly located.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Anchor built-in equipment in place.

3.3 ADJUSTING

A. Adjust equipment to provide efficient operation.

3.4 CLEANING

A. Remove packing materials from equipment and properly discard.

B. Wash and clean equipment.

END OF SECTION 11 30 13

SECTION 11 57 00 - VOCATIONAL AND SHOP EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Workbenches.

B. Related Sections:
   1. Section 06 10 00 - Rough Carpentry: Blocking.

1.2 REFERENCE STANDARDS

A. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

B. ASME BPVC - Boiler and Pressure Vessel Code; 2023.

C. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2023a.

D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

E. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

F. ASTM A879/A879M - Standard Specification for Steel Sheet, Zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface; 2022.

G. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2023, with Editorial Revision.

H. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

I. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2019.

J. NAAMM AMP 500-06 - Metal Finishes Manual; 2006.

K. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate installation of laboratory equipment with laboratory casework and Owner-furnished, Owner-installed laboratory equipment.

B. Preinstallation Meeting: Convene one week before starting work of this section.

C. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.4 SUBMITTALS

A. Refer to Section 01 40 00 - Quality Requirements for submittal procedures.

B. Product Data: Provide equipment dimensions and construction; equipment capacities; physical dimensions; utility and service requirements, clearances, and locations; required accessories and optional features; and point loads.

C. Shop Drawings: Indicate equipment locations, large scale plans, elevations, cross sections, rough-in and anchor placement dimensions and tolerances, and installation and servicing clearances required.

D. Samples: Submit two samples of exposed finish surfaces, a minimum of 6 by 6 inches in size illustrating color and finish.

E. Operation Data: Include description of equipment operation and required adjusting and testing.

F. Maintenance Data: Identify system maintenance requirements, servicing cycles, lubrication types required and local spare part sources.

G. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing the types of products specified in this section, with minimum three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with minimum three years of documented experience and approved by manufacturer.

C. Preconstruction Testing: Factory-test each type of equipment.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Package each piece of equipment to ensure protection from damage during shipment and delivery. Legibly indicate on the exterior of each container or crate, the shipping address and a brief description of its contents. Outside of the container, fasten a waterproof envelope containing a packing list and complete instructions for uncrating and setting the equipment in place.

B. Protect finished surfaces during handling and installation with protective covering of polyethylene film or another suitable material.

1.7 WARRANTY

A. Refer to Section 01 77 00 - Closeout Procedures and Checklist for additional warranty requirements.

B. Correct defective Work within a two-year period after Date of Substantial Completion.

C. Provide ten year manufacturer warranty for materials, parts, and labor for sterilizer chamber.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work
   1. Fume Dog: www.fumedog.com.
   2. Fischer scientific, Part of Thermo Fisher Scientific: www.fischersci.com.
   3. Labconco Corporation: www.labconco.com.
   4. Uline: www.uline.com.

B. Substitutions: Refer to section 01 25 00 - Substitution Procedures.
   1. Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution

2.2 EQUIPMENT

A. General Conditions:
   1. Prewire and prepipe each unit of equipment complete with trim and fittings. Include reduced pressure or atmospheric type backflow preventer fitting to prevent backflow of polluted water or waste into water supply system or equipment. Comply with applicable code requirements.
   2. Securly affix a plate which includes the manufacturer's name, address, and catalog or serial number to each equipment item. If applicable, include pressure vessels bearing the ASME stamp and pressure rating, indicating compliance with applicable code requirements.
   3. Installation Accessories: Provide all rough-in frames, anchors, supports, accessories and closure trim required for complete installation.
   4. Use corrosion-resistant materials for all rivets, bolts, nuts, studs, spacers, and welding metal.

5. Fully assemble equipment in factory, except for those items which cannot be moved to their final locations as single item.

B. Work Benches:
   1. Basis of Design: Model H-9635 Starter Table manufacturer by Uline.
   2. Description: Cabinet workstation including table, lockable cabinet, and uprights.
   3. Size: 60 by 30 inches.
   4. Material: Steel.
   5. Finish: Powder-coat.
      a. Color: As selected by Architect from manufacturer's full line.
   6. Worksurface: 1-1/2 inch composite wood top.
      a. Species: As selected by Architect.
      b. Cut: As selected by Architect.
      c. Finish: As selected by Architect.
   7. Worksurface Height: Adjustable from 28 to 38 inches.

2.3 MATERIALS

A. Aluminum Sheet: ASTM B209/B209M, 5005-H32 minimum; alloy and temper recommended by aluminum producer and finisher for use and finish indicated.
   1. Finish: AAMA 2603.

B. Galvanized Steel Sheet: ASTM A653/A653M, G90 (Z275) coating.

C. Steel Sheet: ASTM A1008/A1008M uncoated, cold rolled, Type CS (commercial steel), exposed, ASTM A1008/A1008M uncoated, cold rolled, Type CS (commercial steel), exposed, ASTM A879/A879M electrolytic zinc coating over ASTM A1008/A1008M steel sheet substrate, or ASTM A879/A879M electrolytic zinc coating over ASTM A1008/A1008M steel sheet substrate.

D. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304 and 316, stretcher-leveled standard of flatness.

E. Laminated Safety Glass: ASTM C1172.

F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

G. Fasteners: Stainless-steel, or other corrosion-resistant materials, standard with the manufacturer.

H. Welding Materials: Comply with ASME BPVC SEC II-C.

I. Metal Finishes: Comply with NAAMM AMP 500-06.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utility connections, rough-in frames, anchors and supports are accurately placed and deliver building services at specified characteristics and/or within acceptable functional ranges.

B. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with standards required by authority having jurisdiction.

C. Large Components: Ensure that large components can be moved into final position without damage to other construction.

D. Mounting: Anchor equipment securely in place.
   1. Mount equipment in compliance with SMACNA (SRM) requirements.

E. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner, and their locations are coordinated with equipment rough-in requirements.
   1. Require manufacturer's installer to supervise connection to utilities being performed by mechanical and electrical trades.
   2. Make connections between ferrous and nonferrous metallic pipe with dielectric waterways and flanges having temperature and pressure rating equal to or greater than that specified for the connecting piping. Use dielectric waterways internally lined with an insulator specifically designed to prevent current flow between dissimilar metals.
   3. Connect steam lines on equipment to building source only after building steam lines have been cleaned of preservatives and materials that may be harmful to the equipment.

F. Touch-up minor damaged surfaces caused during installation. Replace damaged components as directed by Architect.

3.3 FIELD QUALITY CONTROL

A. Refer to Section 01 40 00 - Quality Requirements for additional requirements.

B. Perform functional testing in accordance with referenced specification requirements. Test one item or similar model, as necessary or appropriate, to ensure that it is operational and installation complies with specification requirements.

3.4 ADJUSTING

A. Adjust operating equipment to efficient operation.

3.5 CLOSEOUT ACTIVITIES

A. Refer to Section 01 77 00 - Closeout Procedures and Checklist for closeout submittals.

B. Refer to Section 01 79 00 - Demonstration and Training for additional requirements.

C. Final Acceptance: Remove labels, fingerprints, and clean all surfaces both inside and out. Repair any marred or damaged surfaces that affect appearance, such as both interior and exterior of cabinets in a manner acceptable to Owner. Replace any parts that cannot be repaired in such a manner.

END OF SECTION 11 57 00

SECTION 11 61 23 - TENSION WIRE GRID SYSTEM

PART 1 - GENERAL

1.1 SECTION SUMMARY

A. This specification describes the provision of the theatrical tension wire grid system above the Black Box.

1.2 RELATED DOCUMENTS

A. Theatre Rigging Drawings (“TR” Series) and general provisions of the contract including general and supplementary conditions and Division 1 Specification sections apply to this section.

1.3 SECTION INCLUDES

A. Coordination, provision, installation, inspection, commissioning, testing, documentation, instruction and warranties of a Tension Wire Grid System.

B. Plant, materials, equipment, transport and labor necessary to accomplish this and have a complete and proper System.

C. Also includes:
1. Required licenses and permits including payment of charges and fees.
2. All fees for testing, documenting, and notary public services.
3. Verification of dimensions and conditions at the job site.
4. Provision of required pre-installation submittals and project record manuals.
5. Installation in accordance with the contract document, manufacturer's recommendation, and in conformity with applicable codes and authority having jurisdiction.
6. Extension of electrical service, including ground, to equipment locations.

1.4 RELATED WORK

A. Division 05: Metals

B. Section 11 61 43: Stage Draperies.

C. Section 11 61 62: Theatrical Lighting and Controls.

1.5 REFERENCES

A. Published specification standards, tests or recommended methods of trade, industry or governmental organizations apply to Work in this section where cited below:
1. American Iron and Steel Institute (AISI),
2. American National Safety Institute (ANSI),
3. American Society of Mechanical Engineers (ASME),
4. American Society of Testing and Materials (ASTM),
5. National Electrical Manufacturer’s Association (NEMA),
6. Occupational Safety and Health Administration (OHSA),
7. Underwriters Laboratories (UL),
8. Entertainment Services and Technology Association (ESTA)
9. Entertainment Technician Certification Program (ETCP)
10.

1.6 DESCRIPTIONS AND REQUIREMENTS

A. This specification is performance-based and requires the Contractor to provide all subsequent design and engineering for the system described and as required for proper installation and safe operation.

B. Black Box Tension-Wire Grid System
   1. Design and provide a system of tension grid panels manufactured from structural steel shapes and $^{1}/_{8}$" diameter wire rope.
   2. Panels shall provide walk-able access for personnel above the stage and shall be transparent to theatrical lighting effects projected through.
   3. Panels shall be suspended from the overhead structure on suitable hangers as located on the drawings with all associated hardware necessary to support the system.
   4. Provide a pipe grid and railing system to be installed above the tension grid to protect un-guarded openings and to support wiring devices and portable lighting fixtures.

C. Supplemental Structural Support
   1. Design and provide supplemental bridging and support as required to span between the building's overhead structural system elements and to support the grid system hangers where required to accommodate the arrangement as described in the drawings.
   2. Provide coordination and documentation for review and approval of all supplemental structure and loads for approval by the Architect and project engineer of record.

D. Additional System Requirements
   1. The installation of the tension grid shall be closely coordinated with the other trades for placement of lighting equipment, AV equipment, architectural features, mechanical equipment, and intermediate structure.
   2. The system shall consist of the components and functions as specified herein. Operational functions desired are called out in terms of performance and the Contractors' proposals shall include all devices necessary to execute the operational parameters described, shown, and listed.
   3. Before expiration of the warranty period, the tension grid contractor shall visit the site to perform a maintenance check including any necessary mechanical adjustments to the tension grid.

1.7 RESPONSIBILITY AND RELATED WORK

A. The drawings included with this specification convey general system concepts. The plans do not show complete and accurate building details. The Installer is responsible for making field measurements necessary to establish exact locations, relationships, load capacities necessary for the installation of these systems.

B. Coordinate the work with the General, Mechanical, Electrical and other related contractors as stated in Part 1.4, and the scheduled work of other trades.

C. Coordinate with the theatrical lighting equipment supplier the installation of the wiring devices mounted to rigging hardware.

D. Supply accessories and minor equipment items needed for a complete system, even if not specifically mentioned in these Specifications or on the associated Drawings, without claim for additional payment.

E. Notwithstanding any detailed information in the Contract Documents, it is the responsibility of the Tension Grid Systems Contractor to supply systems in full working order. Notify the Architect of any discrepancies in part numbers or quantities before bid. Failing to provide such

notification requires Tension Grid Systems Contractor to supply items and quantities according to the intent of the Specifications and associated Drawings without claim for additional payment.

F. Obtain all permits necessary for the execution of any work pertaining to the installation, or any operation by the Owner including any associated charges or fees.

G. Execute all work in accordance with all Standard Authorities listed above, and all applicable State and Local codes, ordinances, and regulations. If a conflict develops between the contract document and the appropriate codes and is reported to the Architect prior to bid opening, the Architect will prepare the necessary clarification. Where a conflict is reported after contract award, propose a resolution of the conflict and, upon approval, perform work.

1.8 QUALITY ASSURANCE

A. Professional Engineer Qualifications: Design of tension grid panels, hangers, and connections to the building structure is to be completed by a Professional Engineer both experienced in the design of tension grid rigging systems and maintaining a current license in the State of Texas.

B. Theatrical Tension Grid Systems Provider's Qualifications: Firm experienced in the provision of systems similar in complexity to those required for this project; and meet the following:
   1. The primary business of the provider shall be the installation of theatrical rigging, specifically tension grid systems.
   2. No less than five years' experience with equipment and systems of the specified types under the same business name.
   3. Experience with at least five projects involving rigging systems, specifically tension wire grids, for facilities of this type and comparable scale within the last two years.
   4. The Project Manager assigned to this project shall have experience installing new theatrical facilities while employed with the installing contractor. Provide names of project team members with proposal.
   5. A competent and knowledgeable Job Superintendent will be on the job site at all times when work is in progress.
   6. All rigging installation work must be supervised or performed by a minimum of one ETCP Certified Rigger.
   7. Employs only fully trained stage riggers and mechanics for the erection of the stage equipment. The stage riggers will be completely familiar with the type of equipment to be installed.
   8. Be a franchised dealer and service facility for the major products furnished.
   9. At the request of the Owner, the Contractor shall demonstrate that he has:
      a. Adequate plant and equipment to complete the work.
      b. Adequate staff with commensurate technical experience.

C. Work shall be in compliance with the applicable standards listed above and all governing codes and regulations of the authorities having jurisdiction and the Contract Documents.
   1. Drawings and specification requirements shall govern where they exceed Code and Regulation requirements.
   2. Where requirements between governing Codes and Regulations vary, the more restrictive provision shall apply.
   3. Nothing in the Contract Documents shall be construed as authority or permission to disregard or violate legal requirements.

D. Attend pre-installation meeting with architect before beginning the installation of systems. Attendees to this meeting must be, but not limited to, the following personnel: Project Manager, Project Engineer, Field Supervisor, and Senior Field Technician.

E. Attend project coordination meetings as called by the General Contractor, Architect and/or Architect's consultant. Attendees to these meetings must be, but not limited to the following personnel: Project Manager, Project Engineer, Field Supervisor, and Senior Field Technician.

1.9 PRE-INSTALLATION SUBMITTALS:

A. The submittal information required by the specification is to be presented complete and as submissions noted below. Submittals are a crucial and integral part of the construction process; as such the Owner's consultant will not recommend payment to the installer above 25% of the scheduled value of this work until all submittal information has been approved. Cost for the Owner's consultant to review secondary and re-submittals due to the Installer's failure to include all required submittal information, or rejection of incomplete or improperly prepared submittal information will be the responsibility of the Installer. The cost shall be based on the hourly rates of the Architect and his consultants as published in their current professional fees schedules and shall also include reimbursable costs for delivery, mailing, and photocopies at direct cost plus ten percent (10%).

B. Project Submittal Part 1:
   1. Provide for approval not later than thirty (30) days after issuance of Notice to Proceed and prior to commencement of Work:
      a. Section 1: A complete schedule of submittals.
      b. Section 2: A chronological schedule of Work in bar chart form. Revise and resubmit schedule as required to reflect construction progress.

C. Project Submittal Part 2:
   1. Provide for approval no later than sixty (60) days after issuance of notice to proceed and in accordance with previously submitted submittal schedule.
      a. Section 1: Complete list of products to be incorporated within the Work.
      b. Section 2: Manufacturer's data sheets for each product. Provide original manufacturer's data sheets in order as they appear in the specification. These data sheets are submitted for each product in sufficient detail to facilitate proper evaluation of the products suitability for incorporation within the Work.
      c. Section 4: Submit Material Safety Data Sheets (MSDS) for each potentially hazardous material prior to use. Include information pertaining to the hazardous material with the MSDS.
   2. Drawings:
      a. Provide computer software generated drawings using standard industry graphic standards. Hand or poorly drawn documents will not be accepted. All drawings shall be created on a computer aided drawing (CAD) system compatible with AutoCAD release 2010. Electronic files of theatrical rigging contract documents shall not be distributed for use in generating submittal documents with the exception of architectural backgrounds.
      b. Drawings that reproduce the Consultant's if full or in part are not acceptable.
      c. Installation Drawings. Provide drawings showing special details depicting methods and means specific to each product and each product manufacturer's recommended installation methods and means. Provide assembly and attachment for each product. Drawings should be reviewed and stamped by a registered professional engineer in the state where the project is located.
      d. Schematic Drawings. Provide drawings detailing inter-component and intra-component, on Tension Grid Systems Contractor assembled components or fabricated products.
      e. Equipment and Hardware Drawings. Provide equipment and/or specialty hardware mounting and location details including necessary physical dimensions, clearances, load limits, etc.

f. Floor plan and Section Drawings. Provide drawings showing the exact location of all installed equipment on floor plans and/or sections such as hangers, tracks, battens, etc.
g. General Detail Drawings. Provide detail drawings depicting any unique installation methods specific to each product.
h. Any other pertinent data generated which is necessary to provide the Work.

D. Engineers Stamp
1. The drawings listed above shall bear the signature and seal of the licensed professional engineer responsible for the system design and drawing preparation. The documents shall include copies of all relevant engineering calculations.

E. Submittal Format:
1. Electronic PDF submittals are encouraged.
2. Non electronic submittal shall be bound in a three-ring D style binder sized for 150% of the material with a maximum size being a three-inch spine. Use multiple volumes if necessary.
3. Provide each submittal with a unique number and be numbered in consecutive order.
4. Provide each submittal binder with a cover and a spine reflecting the project title and submittal number.
5. Provide each submittal with a complete table of contents with the following information:
a. Project title and number.
b. Submittal number. In the case of a re-submittal, use the original submittal number immediately followed by the suffix “R” immediately followed by a unique number and be numbered in consecutive order.
c. Date of submission.
d. Referenced addendum or change-order number as applicable.
e. Referenced specification Section, Part, Article, Paragraph and page number or drawing reference as applicable.
f. Index Product Data sheets by manufacturer and model or part number.
6. Separate major grouping with labeled binder tabs.
7. Arrange product data list in alpha-numeric order when applicable followed by unspecified product arrange by manufacturer and model or part number. Follow list by manufacturer’s data sheets, arranged in the same order. If a data sheet shows more than one product, indicate the model being proposed with an arrow or other appropriate symbol.
8. Drawings executed at an appropriate scale, not smaller than 1/8” = 1’-0” for conduit/floor plans, ¼” = 1’-0” for equipment layouts, and ½” = 1’-0” for mounting details and plate/panel details.

F. Submittal Copies:
1. These requirements represent minimum project requirements; a project’s general conditions may require additional copies for project distribution.
2. Submit three (3) bound prints of all drawings.
3. Submit three (3) binders of bound materials (e.g. product submittals).
4. Submit two copies of product or sample finishes as required within this specification.

G. Resubmission Requirements:
1. Make any requested corrections or changes in submittals required. Resubmit for review until no exceptions are taken.
2. Indicate any changes that have been made other than those requested.

H. Approval of Submittals: The submittal information will be reviewed by the general contractor, owner, Architects, engineers, and consultant. Each submittal package will be returned, stamped as follows:

1. “No Exceptions Taken” proceed with construction, all job site coordination will be at the direction of the general contractor.

2. “Make Corrections Noted: No Resubmission Required” submittals have been returned with conditional approval. Corrections, as indicated on the returned drawings and/or specifications, must be made before construction can begin.

3. “Make Corrections Noted: Submit Corrected Copy” submittals have been returned with conditional approval. Corrections, as indicated on the returned drawings and/or specifications, must be made in writing and returned to the consultant before construction can begin.

4. “REJECTED, Submit Specified Item” a specified item in the submittal has been rejected for the reasons noted. Re-submit in compliance with the specifications.

5. “REJECTED, Revise and Re-submit” submittal has been rejected for the reasons noted. Re-submit in compliance with the specifications.

6. “No Review Action Required” all information provided was for information or coordination purposes only. Review is not required.

1.10 PROJECT RECORD MANUAL

A. Submit three bound original sets (this is a minimum of two for the Owner and one for the Architect’s consultant; additional copies may be required by the project’s general conditions) after substantial completion and prior to final inspection.

B. The Project Record Manual shall be segregated into three separate bindings as follows:
   1. Operations Manual:
      a. Product Data: Product actually incorporated within the Work:
         1) Manufacturer's data for each type of product conforming to the scheme above. The list shall include the manufacturer’s serial numbers.
         2) Owner/Instruction Manual for each product.
         3) For custom circuits or modifications, a description of the purpose, capabilities, and operation of each item.
         4) The manufacturer’s wiring diagram for each type of product actually incorporated.
         5) Separately bound list by manufacturer and model or part number of all products incorporated within the Work arranged in alphanumeric order.
      b. Record drawings: Final rendition of that specified depicting what is actually incorporated within the Work. Provide one (1) full size set and one (1) DVD containing all CAD generated drawings prepared in conjunction with this project. Drawing files to be in AutoCAD Release 2010 or above DWG format.
      c. Test Reports: Recorded findings of testing specification of this specification.
      d. System Operation and Instructions: Prepare a complete and typical procedure for the operation of the equipment as a system, organized by subsystem or activity.
         1) This procedure should describe the operation of all system capabilities.
         2) Assume the intended reader of the manual to be technically experienced but unfamiliar with the components and the facility.
   2. Service & Maintenance Manual:
      a. Provide an original copy of the service manual on every piece of equipment for which the manufacturer offers a service manual. Arrange manuals in the same order as the operations manual.
      b. Manufacturer’s maintenance and care instructions.

c. Maintenance Instructions, including maintenance phone number(s) and hours; maintenance schedule; description of products recommended or provided for maintenance purposes, and instructions for the proper use of these products.
d. Replacement parts list of all minor equipment such as fuses, lamps, connectors, knobs, etc.

3. Warranty Manual:
   a. Manufacturer's warranty statements on each product.
   b. Date of substantial completion and ending dates for warranties for each group of products.
   c. Software registration and licenses.

C. Include any other pertinent data generated during the Project or required for future service.

D. Appropriately duplicate data within the separate bindings when it will reasonably clarify procedures, e.g., operational data in maintenance binding.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Ship product in its original container, to prevent damaging or entrance of foreign matter.

B. Handling and shipping in accordance with manufacturer’s recommendation.

C. Provide protective covering during construction, to prevent damaging or entrance of foreign matter.

D. Replace at no expense to Owner, product damaged during storage, handling or the course of construction.

1.12 PROJECT CONDITIONS

A. Verify conditions on the job site applicable to this work. Notify Architect in writing of discrepancies, conflicts, or omissions promptly upon discovery.

B. The Drawings diagrammatically show arrangements of equipment fitting the space available without interference. If conditions exist which make it impossible to install work as shown, recommend solutions and/or submit drawings to the Architect for approval, showing how the work may be installed.

1.13 FINAL INSPECTION AND TESTING

A. Upon completion of installation, initial adjustments, tests and measurements specified in Part 3, and submission and review of the results, a final inspection and test will be observed by the Architect and/or Architect’s Consultant no earlier than two weeks after receipt of the written results.

B. Provide a minimum of one (1) person for inspection to assist the Consultant.

C. The process of testing the System may necessitate moving and adjusting certain components such as adjustment of drapery tracks, etc.

D. Testing includes operation of each major system and any other components deemed necessary. Perform tests and provide required test equipment, tools and material required to make any necessary repairs, corrections, or adjustments.

E. The following procedures will be performed on each System:

1. Inspection of the methods and means employed to incorporate the System within the facility.
2. Verification of proper adjustment, balance, and alignment of equipment for optimum quality and to meet the manufacturer's published specifications settings within the Record Documents.
3. Other tests on equipment or systems deemed appropriate.

F. Final inspection shall be by the Theatre Consultant. The Contractor shall demonstrate the operation of all equipment at a date and time approved by the Architect. As a portion of the final inspection, the Contractor shall conduct a “full load test” of the tension grid system, using dead weight equivalent to the maximum designed weight of the system. Each tension grid panel will be tested using a 1'-0" diameter sandbag containing 350 pounds of sand and placed in the center of each panel.

G. In the event the need for further adjustment or work becomes evident during testing, the Tension Grid Systems Contractor is to continue his work until the System is acceptable at no addition to the contract price. If approval is delayed because of defective equipment, or failure of equipment or installation to meet the requirements of these specifications and any extension of the inspection and testing period is required, the contract price will be reduced for the additional time and expenses of the Owner, at the standard rate in effect at that time. All additional re-punch trip costs shall be at the Consultant’s standard rate and the responsibility of the tension grid contractor.

1.14 WARRANTY

A. Warrant labor and product for five (5) years following the date of substantial completion to be free of defects and deficiencies, and to conform to the drawings and specifications as to kind, quality, function, and characteristics. Repair or replace defects occurring in labor or product within the Warranty period without charge. Any cost required to complete this warranty repair is the responsibility of the contractor.

B. This warranty is in addition to any specific warranties issued by manufacturers for greater periods of time.

C. Within the warranty period, answer service calls within eight hours, and correct the deficiency within twenty-four hours.

1.15 INSTRUCTION OF OWNER PERSONNEL

A. After final completion provide instruction to Owner and/or the Owner’s designated personnel on the use, operation, maintenance and care of the System.

B. Develop training course based on the use of the System and manufacturers’ recommendation. Provide four (4) hours of training. All training shall be scheduled at the convenience of the owner and designated personnel.

C. Submit an outline of the course with sample instructional aides for approval thirty days (30) prior to scheduled instruction sessions.

D. If a representative of the manufacturer is used in the instructional course, the Tension Grid Systems Contractor must be present throughout the extent of the course and ensure that the representative abides by the requirements set forth in these specifications.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Model numbers and manufacturers included in this specification are listed to establish a standard of product quality.

B. Substitution of specified products with other qualified manufacturers and products will be considered providing:
   1. Proper substitution procedures outline under Division 1 is adhered to.
   2. A request for substitution of each specific product must be made in writing by a bidding Contractor not less than ten (10) business days prior to bid for written approval of the Architect.
   3. Sufficient data of the products is presented for prior approval including technical data, manufacturer's specifications, samples, and, if requested, results of independent testing laboratory tests.
   4. Written permission is obtained for the substitution from the Owner or Owner's Representative.

C. If the proposed system includes equipment other than specified model numbers, submit a list of major items and their quantities, with a one-line schematic diagram for review. Include a list of previously installed projects using proposed equipment that are similar in nature to the specified System.

D. Provide product not specifically specified commensurate with the quality and standards established by the specified product.

2.2 GENERAL

A. Products shall be new, free from defects and listed by UL when an applicable UL Standard exists. Provide product of a given type from one manufacturer.

B. Regardless of the length or completeness of the descriptive paragraph herein, provide product complying with the specified manufacturers' published specifications.

2.3 CONTACTS

A. Listed below is contact information for manufacturers of tension wire grid systems approved to provide equipment on this project:
   1. InterAmerica Stage, Inc.
      a. 4300 St. Johns Parkway, Sanford FL, 32771
      b. Telephone: 407-302-0881
   2. Texas Scenic Company
      a. 8053 Potranco Rd, San Antonio, TX 78251
      b. Telephone (210) 684-0091
   3. JR Clancy, Inc.
      a. 7041 Interstate Island Road, Syracuse, NY 13209
      b. Telephone: (800) 836-1885
   4. Productions Unlimited, Inc.
      a. 175 Old Airport Rd, Roebuck, SC 29376
      b. Telephone (864) 675-6146

2.4 TENSION GRID

A. General:

1. The tension grid structure shall consist of a series of rectilinear panels fabricated of structural steel shapes that constitute a frame for a woven wire rope mat.
2. The panels shall be suspended from the structure so that they can provide a walking surface for trained stage personnel.
3. The panels shall be fabricated at a manufacturer's location and shipped to the jobsite.
4. The nominal size of the panels shall be as described in the drawings. Precise dimensions shall be based on the spacing of the structural members that support the grid structure.
5. The maximum deflection of the woven wire rope surface shall not be greater than L/80 under a 150-pound point load.
6. The designed live load for the grid shall be 25 pounds per square foot.
7. All tension grid frames and auxiliary steel shall be painted one shop coat of approved rust inhibiting primer and one field coat in color determined by the Architect. All welds shall be painted with rust inhibiting primer prior to field coat.
8. No paint shall come into contact with cables or tensioning hardware.

B. Grid Panels:
1. The frame of each grid panel shall be fabricated of ASTM grade A-36 structural steel shapes. Size of frames is to be determined by the structural spacing and projected load.
2. Frames shall have continuous butt welds at each 90-degree corner; corners shall be chamfered to provide clearance for suspension members.
3. Frame shall be drilled and de-burred to provide attachment of the woven wire rope segments. All cable holes shall be in the upper half of each frame.
4. Weld lateral bracing stiffeners between the web of each channel across the frame as necessary to prevent buckling or deformation.
5. Maximum frame compression on any member shall be 5000 pounds.
6. Grid panels shall be factory coated in a durable black enamel finish.

C. Wire Rope Grid Surface:
1. The panel surface is constructed of two perpendicular sets of $^{1}/_{8}$" diameter wire ropes. Each set of wire ropes shall be interwoven forming a mesh of wire ropes spaced at a nominal 2-inches on center. The weave of each wire rope shall pass above each crossing cable then below the next crossing cable, repeating until the cable reaches the opposite frame of the grid panel. Parallel cables shall be woven opposite the cables next to it.
2. Where any frame has an angled face, provide bolted connections with appropriate beveled washers to assure flat seating of the fittings.
3. Termination of Wire Rope
    a. Wire ropes shall be terminated with corrosion-resistant threaded studs at each end.
    b. Terminations shall be factory swaged and shall be rated to exceed the breaking strength of the wire rope.
    c. Wire rope ends shall be secured to frames with a pair of rated nuts on each side of the hole and shall lock the stud in place. Secure swaged stud fitting in place with one flat washer and one nylon locking nut.
    d. All wire rope should be tensioned equally and verified by using a torque wrench or similar means.
4. Each wire rope shall be of a continuous length, free of knots, kinks, or splices.
5. Wire rope shall be ⅛" diameter 7 x 19 galvanized and blackened cable. Cable shall be rated at not less than 2000-pound breaking strength.
6. Wire rope shall be factory coated black.

D. Grid Hangers
1. Tension members shall be engineered, fabricated and installed to support the required loads. Hangers shall also be used as anchorages for the integrated lighting and handrail system and shall have an outside diameter equivalent to ASTM A53/A nominal 1-1/2" I.D. Schedule 40 plain end steel pipe.

2. All hangers should be securely attached to the overhead structure using hardware rated for the purpose.
3. Hangers shall support the panels from beneath the frame and securely attach to the frame using a bolted connection.
4. Hangers shall be designed to accommodate irregularities in the building framing system above while allowing the grid elements to be installed plumb, square and cleanly aligned with one another.

E. Hardware:
1. All bolts and fasteners shall be grade 5 or better.
2. All bolted attachments shall have lock washers or other approved self-locking hardware.

F. Acceptable Product:
1. SkyDeck by InterAmerica, Stage Inc.,
2. or approved equal.

2.5 PIPE GRID AND RAILING SYSTEM:

A. Provide an array of lighting-fixture mounting grid-segments fabricated arranged as indicated on the drawings.
1. Grid segments will be constructed of new ASTM A53/A nominal 1-½" I.D. Schedule 40 plain end steel pipe.
2. Hardware and cross-pipe railings shall be compatible with the tension grid hanger system and provided by the tension grid manufacturer.
3. Grid-segments and hardware shall be installed with user-adjustable components to allow future re-arrangement of the pipe segments if and as required for operational.

B. Provide perimeter multi-pipe railings to protect access at overhead regions open to below.
1. Hardware and cross-pipe railings shall be compatible with the tension grid hanger system and provided by the tension grid manufacturer.
2. Railings shall meet the nominal spacing requirements as indicated on the drawings.
3. Railings will be constructed of new ASTM A53/A nominal 1-½" I.D. Schedule 40 plain end steel pipe compatible with all pipe-grid segments described above.

C. Provide supplemental loose pipe segments matching the fixed and perimeter railing system for user application as required.
1. Length: 11 ft.
2. Quantity: twenty (20)

D. Swivel Pipe Clamps
1. Provide supplemental “Cheeseboro” type pipe/tubing clamps to allow additional pipe segments described above to be added to the grid-system as required.
2. Clamps shall be swivel-type and shall lock onto each pipe-segment with a hinged-clamshell action secured by locking nuts on each segment half.
3. Quality/Safety Certifications: BS1139 (1982 & 1991), EN74 class A & B
4. Dimensions: 48.3 x 48.3mm (1 29 / 32" x 1 29 / 32")
5. Material: drop forged carbon steel with T-bolt
6. Style: flanged
7. Tube sizes: 1-1/4” through 1-1/2” nominal diameter sch. 40 pipe.
8. Finish: galvanized; painted black
9. Quantity (40)

2.6 RIGGING ACCESSORIES:
1. In certain instances, special component parts, such as mule blocks, idler blocks, extra lines, etc., shall be necessary to provide a fully operable system. Where such

requirements are necessary, furnish these components comparable to the quality of the products specified in these specifications.

2. Acceptable manufacturers:
   a. H&H Specialties
   b. JR Clancy
   c. Crosby

2.7 COMPLETED SYSTEM

A. General
   1. All installation of stage rigging equipment shall be completed utilizing new materials, free from flaws and rust, and in good working order. The jobsite shall be cleaned of all packing materials, lubricants, metal shaving, miscellaneous hardware, and components not used in the installation.
   2. All dimensions are to be field verified. Location and attachment of hardware and size of components shall be confirmed by the Tension Grid Systems Contractor.
   3. All electrical power, outlets, related systems, and structural elements required to make the system fully functional are the responsibility of the contractor.
   4. If components and hardware are not specifically specified or called out, it is the responsibility of the contractor to provide those components in order to provide a fully operational tension grid system.

PART 3 - EXECUTION

3.1 GENERAL

A. Coordinate incorporation of the Work specified herein with other project work so as to facilitate a cohesive final product.

B. Mount equipment and enclosures plumb and level.

C. Permanently installed equipment to be firmly and safely held in place in accordance with specified safety factors and Federal and State codes and regulations.

D. Work shall be completed within industry guidelines, including, ESTA, OSHA, ANSI, ASTM, AISC plus any or all local, governmental, or other applicable codes.

E. All stage rigging work must be supervised or performed by a minimum of one ETCP Certified Rigger.

F. Where dimensions and loading capacities have been omitted from this specification, they are to be determined by the Tension Grid Systems Contractor, in accordance with the accepted industry standards and guidelines in this section. In no way will Tension Grid Systems Contractor be relieved of primary responsibility to provide a safe, fully functional system.

G. The mechanical fabrication and workmanship will incorporate the best practices for good fit and finish. There will not be any burrs or sharp edges to cause a hazard, nor will there be any sharp corners accessible to personnel.

H. All equipment will be installed based on the manufacturer's recommendations and for the use intended by the manufacturer.

I. All shop and field welding will meet the qualifications of the AISC manual and will be without spatter or other evidence of poor practices.

J. All finishes which are disturbed during shipping and installation will be touched up to match the original.

K. Materials will conform to the following ASTM standard specifications:
   1. A-36 structural steel
   2. A-36 steel plates and bars
   3. A-47 malleable iron casting
   4. A-48 gray iron casting
   5. A-53 steel pipe
   6. A-120 black and hot-dipped for ordinary use.

L. In order to establish minimum standards of safety, the following factors will be used:
   1. cables and fittings provide an 8 safety factor
   2. cable bending ratio is 30 times the cable diameter
   3. nuts and bolts use minimum SAE grade 5 (ASTM rating A-449)
   4. thread pressure of
      a. 500 lb. for cast iron
      b. 1000 lb. for steel
      c. 1500 lb. for Nylatron
      d. Steel to $^1/_5$ of yield

3.2 CONTRACTOR COMMISSIONING

A. Prior to testing the System ensure the following:
   1. Products are installed in a proper and safe manner according to manufacturer's instructions.
   2. Dust, debris, etc. is removed.
   3. Labeling has been provided.
   4. Temporary facilities and utilities have been properly disconnected, removed and disposed of off-site.
   5. Products are neat, clean and unmarred and parts securely attached.
   6. Broken work, including glass, raised flooring and supports, ceiling tiles and supports, walls, doors, etc. have been replaced or properly repaired, and debris cleaned up and discarded. Job site shall be left broom clean.
   7. Furnish all required operation, maintenance, and loading materials.

B. In the event the need for further adjustment or work becomes evident during testing, the Contractor is to continue his work until the System is acceptable at no addition to the contract price. If approval is delayed because of defective equipment, or failure of equipment or installation to meet the requirements of these specifications and any extension of the inspection and testing period is required, the contract price will be reduced for the additional time and expenses of the Owner, at the standard rate in effect at that time.

END OF SECTION 11 61 23

SECTION 11 61 43 - STAGE DRAPERIES

PART 1 - GENERAL

1.1 SECTION SUMMARY

A. This specification describes the manufacture and installation of stage curtains in the Black Box.

1.2 RELATED DOCUMENTS

A. Theatre Rigging Systems Drawings (“TR” Series) and general provisions of the contract including general and supplementary conditions and Division 1 Specification sections apply to this section.

1.3 SECTION INCLUDES

A. Coordination, provision, installation, inspection, commissioning, testing, documentation, instruction, and warranties of stage draperies and tracks.

B. Plant, materials, equipment, transport, and labor necessary to accomplish this and have a complete and proper System.

C. Also includes:
1. Required licenses and permits including payment of charges and fees.
2. All fees for flame proofing, testing, documenting, and notary public services.
3. Verification of dimensions and conditions at the job site.
4. Provision of required pre-installation submittals and project record manuals.
5. Installation in accordance with the contract document, manufacturer's recommendation, and in conformity with applicable codes and authority having jurisdiction.

1.4 RELATED WORK

A. Section 11 61 23: Tension Wire Grid System.

1.5 REFERENCES

A. Published specification standards, tests or recommended methods of trade, industry or governmental organizations apply to Work in this section where cited below:
1. National Fire Protection Agency (NFPA)
2. American National Standards Institute (ANSI),
3. American Society of Testing and Materials (ASTM),
4. Occupational Safety and Health Administration (OHSA),
5. Entertainment Services Technology Association (ESTA)

1.6 DESCRIPTIONS AND REQUIREMENTS

A. The following is intended to further describe the Work and clarify design intent and is not an exhaustive description for the Stage Curtains. Refer to the Theatre Rigging (TR Series) drawings for further information relating to this Section.

B. Black Box
1. Drapery for the black box shall consist of masking curtains as described on the drawings.
2. Walk along curtain tracks for the black box shall be as described on the drawings.
3. Drapery and associated hardware shall mount on walk along curtain tracks as scheduled on the drawings.

4. Draperies shall be constructed of professional grade fabric intended for use as stage curtains. All draperies will be certified as flame retardant as a result of either their inherent characteristics or chemical treatment in accordance with the AHJ.

1.7 RESPONSIBILITY AND RELATED WORK

A. The drawings included with this specification convey general system concepts. The plans do not show complete and accurate building details. The Installer is responsible for making the field measurements necessary to establish exact locations, relationships, load capacities necessary for the installation of these systems.

B. Coordinate the work with related scope as stated in Part 1.4, and the scheduled work of other trades.

C. Supply accessories and minor equipment items needed for a complete system, even if not specifically mentioned in these Specifications or on the associated Drawings, without claim for additional payment.

D. Notwithstanding any detailed information in the Contract Documents, it is the responsibility of the Contractor to supply systems in full working order. Notify the Architect of any discrepancies in part numbers or quantities before bid. Failing to provide such notification requires Contractor to supply items and quantities according to the intent of the Specifications and associated Drawings without claim for additional payment.

E. Obtain all permits necessary for the execution of any work pertaining to the installation, or any operation by the Owner including any associated charges or fees.

F. Execute all work in accordance with all Standard Authorities listed above, and all applicable State and Local codes, ordinances, and regulations. If a conflict develops between the contract document and the appropriate codes and is reported to the Architect prior to bid opening, the Architect will prepare the necessary clarification. Where a conflict is reported after contract award, propose a resolution of the conflict and, upon approval, perform work.

G. Flame proofing and Documentation of Drapery Fabrics:
   1. Provide inherently flame retardant or chemically flame proofed draperies. Chemical flame proofing formula and process must adhere to Bureau of Standards U.S. Department of Commerce. Once fabric is processed, it will pass such tests as are required by the Fire Marshall of the local fire department, the Owner, and any other authority having jurisdiction.
   2. A certificate for each drape is required to be provided to the Owner. This certificate clearly indicates: the name of the Stage Drapery (sub) Supplier, the name and color of the fabric, the name of the Company providing flame proofing treatment, date of the treatment, the date of re-treatment required, the name of the chemical and method used, the signature of an officer or approved representative of the Company providing flame proofing treatment, and the signature of an officer of the company installing the draperies. Official seal(s) and signature(s) of a notary public is required for both signatures.
   3. Labels clearly indicating date of manufacture, cloth type, manufacturer's name and address, size (width and height using ¾" minimum lettering), and Owner's designated inventory number (to be coordinated with Owner) will be sewn into the back (in most cases, upstage) side of the upper hem at both ends of each drape panel.

1.8 QUALITY ASSURANCE

A. Stage Curtain Installer’s Qualifications: Firm experienced in the provision of systems similar in complexity to those required for this project; and meet the following:

1. No less than five years' experience with equipment and systems of the specified types under the same business name.
2. Experience with at least five comparable scale projects within the last two years.
3. Employ only fully trained stage riggers and mechanics for the erection of the stage equipment.
4. The stage riggers will be completely familiar with the type of equipment to be installed. A competent and knowledgeable Job Superintendent will be on the job site at all times when work is in progress.
5. Maintain a fully staffed and equipped service facility.
6. Stage Curtain Installer shall attend pre-installation meetings to coordinate with other trades as required.

1.9 PRE-INSTALLATION SUBMITTALS

A. The submittal information required by the specification is to be presented complete and as submissions noted below. Submittals are a crucial and integral part of the construction process; as such the Owner's consultant will not recommend payment to the installer above 25% of the scheduled value of this work until all submittal information has been approved. Cost for the Owner's consultant to review secondary and re-submittals due to the Installer's failure to include all required submittal information, or rejection of incomplete or improperly prepared submittal information will be the responsibility of the Installer. The cost shall be based on the hourly rates of the Architect and Architect's Consultants as published in their current professional fees schedules and shall also include reimbursable costs for delivery, mailing, and photocopies at direct cost plus ten percent (10%).

B. Project Submittal Part 1:
   1. Provide for approval not later than thirty (30) days after issuance of Notice to Proceed and prior to commencement of Work:
      a. Section 1: A complete schedule of submittals.
      b. Section 2: A chronological schedule of Work in bar chart form. Revise and resubmit schedule as required to reflect construction progress.

C. Project Submittal Part 2:
   1. Provide for approval no later than sixty (60) days after issuance of notice to proceed and in accordance with previously submitted submittal schedule.
      a. Section 1: Complete list of products to be incorporated within the Work.
      b. Section 2: Manufacturer's data sheets for each product. Provide original manufacturer's data sheets in order as they appear in the specification. These data sheets are submitted for each product in sufficient detail to facilitate proper evaluation to the products suitability for incorporation within the Work.
      c. Section 3: Fabric Samples. Submit a sample book of each fabric specified, containing manufacturer's standard colors available in the quality of fabric specified for the Owner's selection and approval of color. More than one color may be selected. After selection, upon request, submit one square foot sample of each fabric in each color for final review.
      d. Section 4: Submit Material Safety Data Sheets (MSDS) for each potentially hazardous material prior to use. Include information pertaining to the hazardous material with the MSDS.
   2. Drawings:
      a. Provide computer software generated drawings using standard industry graphic standards. Hand or poorly drawn documents will not be accepted. All drawings shall be created on a computer aided drawing (CAD) system compatible with AutoCAD release 2010. Electronic files of theatrical rigging contract documents shall not be distributed for use in generating submittal documents with the exception of architectural backgrounds.

b. Provide complete assembly details of drapes including stitching schematics, weights, attachment details, and fabric/drape schedule.
c. General Detail Drawings. Provide detail drawings depicting any unique installation methods specific to each product.
d. Any other pertinent data generated which is necessary to provide the Work

D. Submittal Format:
1. Electronic submittals in PDF are encouraged. Follow typical format for paper submittals.
2. Each submittal shall be bound in a three-ring D style binder sized for 150% of the material with a maximum size being a three-inch spine. Use multiple volumes if necessary.
3. Provide each submittal with a unique number and be numbered in consecutive order.
4. Provide each submittal binder with a cover and a spine reflecting the project title and submittal number.
5. Provide each submittal with a complete table of contents with the following information:
   a. Project title and number.
   b. Submittal number. In the case of a re-submittal, use the original submittal number immediately followed by the suffix “R” immediately followed by a unique number and be numbered in consecutive order.
   c. Date of submission.
   d. Referenced addendum or change-order number as applicable.
   e. Referenced specification Section, Part, Article, Paragraph and page number or drawing reference as applicable.
   f. Index Product Data sheets by manufacturer and model or part number.
6. Separate major grouping with labeled binder tabs.
7. Arrange product data list in alpha-numeric order when applicable followed by unspecified product arrange by manufacturer and model or part number. Follow list by manufacturer’s data sheets, arranged in the same order. If a data sheet shows more than one product, indicate the model being proposed with an arrow or other appropriate symbol.
8. Drawings executed at an appropriate scale, not smaller than ⅛” = 1’-0” for conduit/floor plans, ¼” = 1’-0” for equipment layouts, and ½” = 1’-0” for mounting details and plate/panel details.

E. Submittal Copies:
1. These requirements represent minimum project requirements; a project’s general conditions may require additional copies for project distribution.
2. Submit three (3) bound prints of all drawings.
3. Submit three (3) binders of bound materials (e.g. product submittals).
4. Submit two copies of product or sample finishes as required within this specification.

F. Resubmission Requirements:
1. Make any requested corrections or change in submittals required. Resubmit for review until no exceptions are taken.
2. Indicate any changes that have been made other than those requested.

G. Approval of Submittals: The submittal information will be reviewed by the general contractor, owner, Architects, engineers, and consultant. Each submittal package will be returned, stamped as follows:
1. “No Exceptions Taken” proceed with construction, all job site coordination will be at the direction of the general contractor.
2. “Make Corrections Noted: No Resubmission Required” submittals have been returned with conditional approval. Corrections, as indicated on the returned drawings and/or specifications, must be made before construction can begin.
3. “Make Corrections Noted: Submit Corrected Copy” submittals have been returned with conditional approval. Corrections, as indicated on the returned drawings and/or

specifications, must be made in writing and returned to the consultant before construction can begin.

4. "REJECTED, Submit Specified Item" a specified item in the submittal has been rejected for the reasons noted. Re-submit in compliance with the specifications.
5. "REJECTED, Revise and Re-submit" submittal has been rejected for the reasons noted. Re-submit in compliance with the specifications.
6. "No Review Action Required" all information provided was for information or coordination purposes only. Review is not required.

1.10 PROJECT RECORD MANUAL

A. Submit three bound original sets (this is a minimum of two for the Owner and one for the Architect's consultant; additional copies may be required by the project's general conditions) after substantial completion and prior to final inspection.

B. The Project Record Manual shall be segregated into three separate bindings as follows:
   1. Operations Manual:
      a. Product Data: Product incorporated within the Work:
         1) Manufacturer's data for each type of product conforming to the scheme above. The list shall include the manufacturer's serial numbers.
         2) Owner/Instruction Manual for each product.
         3) For custom circuits or modifications, a description of the purpose, capabilities, and operation of each item.
         4) The manufacturer's wiring diagram for each type of product actually incorporated.
         5) Separately bound list by manufacturer and model or part number of all products incorporated within the Work arranged in alphanumeric order.
      b. Record drawings: Final rendition of that specified depicting what is actually incorporated within the Work. Provide one (1) full size set and one (1) CD-ROM containing all CAD generated drawings prepared in conjunction with this project. Drawing files to be in AutoCAD Release 2010 DWG format.
      c. Test Reports: Recorded findings of testing specification of this specification.
      d. System Operation and Instructions: Prepare a complete and typical procedure for the operation of the equipment as a system, organized by subsystem or activity.
         1) This procedure should describe the operation of all system capabilities.
         2) Assume the intended reader of the manual to be technically experienced but unfamiliar with the components and the facility.
   2. Service & Maintenance Manual:
      a. Provide an original copy of the service manual on every piece of equipment for which the manufacturer offers a service manual. Arrange manuals in the same order as the operations manual.
      b. Manufacturer's maintenance and care instructions.
      c. Maintenance Instructions, including maintenance phone number(s) and hours; maintenance schedule; description of products recommended or provided for maintenance purposes, and instructions for the proper use of these products.
      d. Replacement parts list of all minor equipment such as fuses, lamps, connectors, knobs, etc.
   3. Warranty Manual:
      a. Manufacturer's warranty statements on each product.
      b. Date of substantial completion and ending dates for warranties for each group of products.
      c. Software registration and licenses.
   4. Drapery Flame proofing Documentation:
      a. Provide all certificates, test reports, and documentation required for drapery flame proofing.

C. Include any other pertinent data generated during the Project or required for future service.

D. Appropriately duplicate data within the separate bindings when it will reasonably clarify procedures, e.g., operational data in maintenance binding.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Ship product in its original container, to prevent damaging or entrance of foreign matter.

B. Handling and shipping in accordance with manufacturer's recommendation.

C. Provide protective covering during construction, to prevent damaging or entrance of foreign matter.

D. Replace at no expense to Owner, product damaged during storage, handling or the course of construction.

1.12 PROJECT CONDITIONS

A. Verify conditions on the job site applicable to this work. Notify Architect in writing of discrepancies, conflicts, or omissions promptly upon discovery.

B. The Drawings diagrammatically show arrangements of equipment fitting the space available without interference. If conditions exist which make it impossible to install work as shown, recommend solutions and/or submit drawings to the Architect for approval, showing how the work may be installed.

1.13 FINAL INSPECTION AND TESTING

A. Upon completion of installation, initial adjustments, tests and measurements specified in Part 3, and submission and review of the results, a final inspection and test will be observed by the Architect and/or Architect's Consultant no earlier than two weeks after receipt of the written results.

B. Provide a minimum of one (1) person for inspection and testing familiar with aspects of the System to assist the Owner.

C. The process of testing the System may necessitate moving and adjusting certain components such as counterweights on arbors, adjustment of drapery tracks, etc.

D. Testing includes operation of each major system and any other components deemed necessary. Perform tests and provide required test equipment, tools and material required to make any necessary repairs, corrections, or adjustments.

E. The following procedures will be performed on each System:
   1. Inspection of the methods and means employed to incorporate the System within the facility.
   2. Verification of proper operation.
   3. Verification of proper adjustment, balance, and alignment of equipment for optimum quality and to meet the manufacturer's published specifications. Establish and mark normal settings for each setting, and appropriately record these settings within the Record Documents.
   4. Other tests on equipment or systems deemed appropriate.

F. In the event the need for further adjustment or work becomes evident during testing, the Installer is to continue his work until the System is acceptable at no addition to the contract price. If approval is delayed because of defective equipment, or failure of equipment or installation to meet the requirements of these specifications and any extension of the inspection and testing period is required, the contract price will be reduced for the additional time and expenses of the Owner, at the standard rate in effect at that time.

G. Installer shall return to the jobsite six months after acceptance to
   1. Inspect curtains and attachments
   2. Re-trim all curtains.

1.14 WARRANTY

A. Warrant labor and product for two (2) years following the date of substantial completion to be free of defects and deficiencies, and to conform to the drawings and specifications as to kind, quality, function, and characteristics. Repair or replace defects occurring in labor or product within the Warranty period without charge. Any cost required to complete this warranty repair is the responsibility of the contractor.

B. This warranty is in addition to any specific warranties issued by manufacturers for greater periods of time.

C. Within the warranty period, answer service calls within eight hours, and correct the deficiency within twenty-four hours.

1.15 INSTRUCTION OF OWNER PERSONNEL

A. After final completion, provide instruction to Owner and/or the Owner's designated personnel on the maintenance and care of the Stage Drapery.
   1. Develop training course based on the use of the System and manufacturers' recommendation. Provide one (1) hour of training. All training shall be scheduled at the convenience of the owner and designated personnel.
   2. Submit an outline of the course with sample instructional aids for approval thirty days (30) prior to scheduled instruction sessions.

B. If a representative of the manufacturer is used in the instructional course, the Installer must be present throughout the extent of the course and ensure that the representative abides by the requirements set forth in these specifications.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Model name and number for manufacturers included in this specification are listed to establish a standard of product quality.

B. Substitution of specified products with other qualified manufacturers and products will be considered providing:
   1. Proper substitution procedures outline under Division 1 is adhered to.
   2. A request for substitution of each specific product must be made in writing by a bidding Contractor not less than ten (10) business days prior to bid for written approval of the Architect.
   3. Sufficient data of the products is presented for prior approval including technical data, manufacturer's specifications, samples, and, if requested, results of independent testing laboratory tests.

4. Written permission is obtained for the substitution from the Owner or Owner's Representative.

C. If the proposed system includes equipment other than specified model numbers, submit a list of major items and their quantities, with a one-line schematic diagram for review. Include a list of previously installed projects using proposed equipment that are similar in nature to specified System.

D. Provide product not specifically specified commensurate with the quality and standards established by the specified product.

2.2 GENERAL

A. Products shall be new, free from defects and listed by UL when an applicable UL Standard exists. Provide product of a given type from one manufacturer.

B. Regardless of the length or completeness of the descriptive paragraph herein, provide product complying with the specified manufacturers' published specifications.

2.3 CONTACTS

A. Listed below is contact information for Manufacturers of rigging components approved to provide equipment on this project:

B. K-M Fabrics
1. 2 Waco Street, Greenville, South Carolina 29611
2. Telephone: (800) 845-1896
3. Approved to supply stage drapery fabric.

C. J.B. Martin
1. 445 rue St-Jean-sur-Richelieu, Quebec, Canada J3B 2M1
2. Telephone: (514) 346-6853
3. Approved to supply stage drapery fabric.

D. Rose Brand Fabrics
1. 4 Emerson Lane, Secaucus, NJ 07094
2. Telephone: (800) 223-1624
3. Approved to supply stage drapery, hampers, and miscellaneous associated equipment.

E. Automatic Devices Company
1. 2121 S. 12th Street, Allentown, PA. 18103
2. Telephone: (610) 797-6000
3. Approved to supply curtain track and curtain motors.

F. Wenger (JR Clancy)
1. 7041 Interstate Island Road, Syracuse, NY 13209
2. Telephone: (315) 451-3440
3. Approved to supply stage rigging components, motorized hoists, hoist control, fire safety curtains and accessories, beam clamps, and associated hardware.

G. Crosby Group, Inc.
1. P.O. Box 3128, Tulsa, Oklahoma 74101
2. Telephone: (918) 834-4611
3. Approved to supply rigging hardware including chain, cable clips, cable, and anchor shackles.

H. H&H Specialties
1. P.O. Box 9327, South El Monte, Calif. 91733
2. Telephone: (213) 283-3562
3. Approved to supply stage rigging loft/head blocks, curtain tracks, and curtain motors.

I. Safety Technology International, Inc.
1. 2306 Airport Road, Waterford, MI 48327
2. Telephone: (248) 673 9898
3. Approved to supply polycarbonate device covers.

J. Texas Scenic Company
1. 8053 Potranco Rd, San Antonio, Texas 78251
2. Telephone: (210) 684-0091
3. Approved to supply rigging Hoists and controls, rigging hardware, stage drapery and tracks, and fire curtain systems.

K. Ver Sales, Inc.
1. 2509 N. Naomi Street, Burbank, Ca. 91504
2. Telephone: (818) 567-3000
3. Approved to provide rigging hardware including chain and beam clamps.

L. IWeiss
1. 815 Fairview Avenue Suite 10, Fairview, New Jersey, 07022
2. Telephone: (201) 402-6500
3. Approved to supply rigging hardware, stage drapery, stage rigging loft/head blocks, and curtain tracks.

M. Protech Theatrical Services
1. 3431 N Bruce Street. North Las Vegas, Nevada 89030
2. Telephone: (702) 639-0290
3. Approved to supply rigging hardware. stage drapery, stage rigging loft/head blocks, and curtain tracks.

2.4 STAGE DRAPERY

A. General Specification for Stage Drapery
1. Provide and install all curtains as located and scheduled on the drawings.
2. Field verify all dimensions prior to fabrication of draperies.
3. Curtain fabric of professional grade fabric intended for stage use. If not inherently flame retardant, curtain fabric shall be chemically flame proofed at the mill using an immersion process. Flame proofing certificates for all fabrics used shall be furnished to the owner with the as-built drawings.
4. Sew tags identifying manufacturer and size of panel at each end of webbing at top and at one corner at hem in each drape.
5. Curtains must be constructed with vertical seams unless otherwise specified. The fabric grain shall run nap down and match in all panels. All panels must be un-spliced along their height.
6. Construction
   a. Black Poly webbing at 4” wide shall be double stitched to the top of the curtain with 1” of face fabric turned under the webbing. Natural fiber based webbing is not allowed.
   b. Brass rustproof grommets shall be inserted
      1) at the extreme top corners
      2) in the pleat centers of curtains sewn with fullness, or
      3) on 12” centers for flat curtains.
   c. Grommet holes for track mounted curtains shall be supplied with

1) plated wire “S” hooks, or
2) snap hooks, sewn-in at the spacing noted above.

d. Drapery hung directly from an auxiliary batten shall have a 24” long black cotton tie line fastened in each grommet hole.
e. The center line of the drape shall be marked on the top webbing with “CL” and a white tie line added to the corresponding grommet.
f. Curtains sewn with fullness shall have box pleats spaced 12” on center.
g. Bottom hems shall be 4” wide. These shall be sewn with a separate canvas chain pocket inside so that the bottom of the canvas pocket rides 2 inches above bottom of the hem. Provide #8 plated jack chain in the pocket.
h. All traveling curtains shall be sewn with a side hem as noted in drapery schedule of face fabric turned back at the leading edge. All other vertical hems shall be 2”.

7. Use mercerized cotton thread, minimum weight of #16, color to match drape fabric.
8. Fabric colors shall be as scheduled. Submit color sample card with submittal documents. Make all effort to ensure that curtains of the same color are fabricated from fabrics of the same dye lot.
9. Labeling
   a. Sew labels onto the back (in most cases, upstage) side of the upper hem at both ends of each panel.
   b. Labels shall clearly indicate:
      1) date of manufacture
      2) cloth type
      3) manufacturer's name and address
      4) size (width and height using 3/4" minimum lettering
      5) owner's designated inventory number
10. Acceptable product:
    a. For nominal 20-21-ounce fabric
       1) KM Fabrics Crescent inherently flameproof velour.

2.5 RIGGING HARDWARE

A. Batten Assembly
1. Pipe battens shall be constructed of new ASTM A53/A 1-1/2" nominal schedule 40 plain end steel pipe.
2. Battens exceeding one standard pipe length will be joined using an internal splicing sleeve. Splices must provide the same overall capacity, deflection, and strength to the pipe battens as an un-spliced span. Threaded couplers are not permitted.
   a. Splice sleeves shall be a minimum of 18" in length with a minimum of 9" extending into each pipe batten.
   b. Sleeves will be machined to a diameter that will create a snug fit within the pipe battens.
   c. Splicing sleeves will be fastened to the pipe batten with pins or 3/8” diameter bolts. Locate at least two fasteners on each side of splice joint; alternate direction of fasteners at right angles to one another across the diameter of the pipe.
3. Any fasteners used on pipe battens must meet SAE grade 5 and be equipped with self-locking nuts.
4. Cover the end of each batten with a yellow or white closed end, soft vinyl safety cap at least 4 inches in length.

B. Rigging Accessories:
1. In certain instances, special component parts, such as sheaves, idler blocks, extra lines, etc., will be necessary in order to provide a fully operable system. Where such requirements are necessary, furnish, install, and adjust these components comparable to the quality of the products listed in these specifications.
2. Acceptable manufacturers:
   a. H&H Specialties

b. JR Clancy
c. Crosby
d. Sapsis Rigging

2.6 COMPLETED SYSTEM

A. General
1. All installation of stage rigging equipment shall be completed utilizing new materials, free from flaws and rust, and in good working order. The jobsite shall be cleaned of all packing materials, lubricants, metal shaving, miscellaneous hardware, and components not used in the installation.
2. All dimensions are to be field verified. Location and attachment of hardware and size of components shall be confirmed by the stage rigging installer.
3. All electrical power, outlets, related systems, and structural elements required to make the system fully functional are the responsibility of the contractor.

B. Trimming/Leveling of Drapery
1. Contractor is to return to the jobsite within sixty (60) days, but not less than thirty (30) days of the installation to re-trim all tracks and curtains.
2. Provide documented notes on site visit to Architect and Architect's Consultants on adjustments made during return visit

PART 3 - EXECUTION

3.1 GENERAL

A. Coordinate incorporation of the Work specified herein with other project work so as to facilitate a cohesive final product.

B. Mount equipment and enclosures plumb and level.

C. Permanently installed equipment to be firmly and safely held in place in accordance with specified safety factors and Federal and State codes and regulations.

D. Work shall be completed within industry guidelines, including, ESTA, OSHA, ANSI, ASTM, NFPA, plus any or all local, governmental, or other applicable codes.

E. Where dimensions and loading capacities have been omitted from this specification, they are to be determined by the theatre rigging contractor, in accordance with the accepted industry standards and guidelines in this section. In no way will the theatre rigging contractor be relieved of the primary responsibility of providing a safe, fully functional system.

F. The mechanical fabrication and workmanship will incorporate the best practices for good fit and finish. There will not be any burrs or sharp edges to cause a hazard, nor will there be any sharp corners accessible to personnel.

G. All equipment will be installed based on the manufacturer's recommendations and for the use intended by the manufacturer.

H. All finishes which are disturbed during shipping and installation will be touched up to match the original.

3.2 INSTALLATION OF STAGE DRAPES AND TRACKS

A. Install all track mounted drapery to hardware according to track manufacturer's recommendations.

B. Stage draperies shall be installed near the end of construction when the chances of damage from other work are reduced. The stage area shall be broom clean with no further construction taking place prior to installation.

C. After hanging stage draperies, thoroughly brush to remove dust, visible dirt, loose threads, loose fabric lint, etc. Wrinkles will be allowed to fall out naturally.

D. Verify that each drapery panel bears a label as described in paragraph 2.4,A,9 above.

END OF SECTION 11 61 43

SECTION 11 61 62 - THEATRICAL LIGHTING AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Provision of the performance lighting and control systems at the Black Box.

1.2 RELATED DOCUMENTS

A. Theatre Lighting Controls Drawings (“TL” Series) and general provisions of the contract including general and supplementary conditions and Division 1 Specification sections apply to this section.

1.3 SECTION INCLUDES

A. Theatrical Lighting Wiring, Cable and Accessories
   1. Network and eDMX cabling
   2. DMX cabling and Back-up cabling
   3. Architectural Lighting control cabling
   4. Preset Station control cabling

B. Theatrical Lighting Distribution
   1. Motorized Breaker Panels
   2. Distribution Wiring Devices

C. Theatrical Lighting Control
   1. Control Equipment Racks
   2. Universal Power Supply
   3. Network Control Components
   4. Network Control Devices
   5. DMX Control Components
   6. DMX Control Devices

D. Control Console and Accessories
   1. Control Consoles
   2. Handheld Remote Focus

E. Miscellaneous Equipment
   1. Safety Lights

F. Portable Fixtures and Accessories
   1. Portable Theatrical Fixtures
   2. Cables and Accessories

G. Coordination, supply, installation, shipping, storage, inspection, commissioning, testing, instruction and warranties of the Theatrical Lighting Controls. Plant, materials, equipment, transport and labor necessary to accomplish this and have a complete and fully functioning System.

H. Also includes:
   1. Required licenses and permits including payment of charges and fees.
   2. Verification of dimensions and conditions at the job site.
   3. Provision of submissions.

4. Installation in accordance with the contract document, Manufacturer's recommendation, and in conformity with applicable codes and authority having jurisdiction.
5. Extension of electrical service, including ground, to equipment locations.

1.4 RELATED WORK NOT IN THIS SECTION

A. Section 11 61 23: Tension Wire Grid System, drawings, and documentation.

A. Section 27 41 16: Integrated Audio Video Systems and Equipment, drawings, and documentation.

B. Division 26: Electrical Work drawings and documentation.

1.5 REFERENCES

A. Published specification standards, tests or recommended methods of trade, industry or governmental organizations apply to Work in this section where cited below:
1. American National Standards Institute (ANSI),
2. American Society of Testing and Materials (ASTM),
3. Electronics Industries Association (EIA),
4. Institute of Electrical and Electronic Engineers (IEEE),
5. National Electrical Manufacturer's Association (NEMA),
6. National Electrical Code (NEC),
7. Underwriters Laboratories (UL),
8. Occupational Safety and Health Administration (OSHA),
9. Entertainment Services and Technology Association (ESTA)
10. United States Institute of Theater Technology (USITT)

1.6 DEFINITIONS

A. In addition to Division 1 definitions, the following list of terms as used in this Section shall be defined as:
1. Owner – Dallas ISD
2. Project – Carter HS Auditorium Renovation and Black Box Addition
3. Consultants – The Owner's Technical Representative for this Section
4. Architect – PBK Architects
5. Contractor – The designer, engineer, and provider of all systems in this Section
6. Furnish/Supply – To purchase, procure, acquire, and deliver complete with all necessary accessories (CWANA)
7. Install – To set in place, join, attach, link, set up or otherwise connect together and test until complete before turning over to the Owner, all parts, items, or equipment supplied by the Contractor.
8. Provide – To furnish and install

1.7 DESCRIPTIONS AND REQUIREMENTS

A. The following is intended to describe the design intent and Work of this Section. It should not be viewed solely for overall requirements for the Theatrical Lighting Systems. Refer to all the Theatrical Lighting Systems (TL Series) documents for information relating to this Section.

A. Lighting and Control System: Black Box Theater
1. The Black Box Theatre lighting system shall be comprised of a dedicated network-based control system communicating with the distributed power system and DMX devices to control all lighting elements within the facility.

2. The lighting control console may be located variously within the Black Box. The console shall operate directly over the network.
3. Motorized breaker panel (MBP) and the control distribution panel (CDP) shall be located in the designated equipment area at the mezzanine level. The control distribution panel will contain all network and DMX interface control components.
4. Remotely switched power shall be distributed throughout the theatre in flush wall-mounted and pipe-mounted devices.
5. Network control shall be distributed throughout the Black Box through a series of plug-in ports for use with portable network node equipment and fixed network DMX nodes.
6. Provide theatrical lighting fixtures and required accessories. Installation is required under this base specification and shall include:
    a. Hang and rough focus to the Owner's selected hanging plot.
    b. Set-up, addressing and patch.
    c. Verification of proper operation and associated training.

1.8 RESPONSIBILITY AND RELATED WORK

A. The drawings included with this specification convey general system concepts. The plans do not show complete and accurate building details. The Contractor is responsible for making field measurements necessary to establish exact locations, relationships, load capacities necessary for the installation of these systems.

A. Coordinate the work with the related scope as stated in Part 1.4, and the scheduled work of other trades.

B. Conduit infrastructure system, including wire for AC Power and grounding for the Theatre Lighting Systems, are provided as part of the General Contract. Coordination between different disciplines is required to achieve a proper conduit system installation and power provisions for Theatre Lighting Systems. All electrical installation shall be in accordance with Division 26 and the NEC.

C. Supply accessories and minor equipment items needed for a complete and fully operational system, even if not specifically mentioned in these Specifications or on the associated Drawings, without claim for additional payment.

D. Notwithstanding any detailed information in the Contract Documents, it is the responsibility of the Contractor to supply systems in full working order. Notify the Architect of any discrepancies in part numbers or quantities before bid. Failing to provide such notification requires the Contractor to supply items and quantities according to the intent of the Specifications and associated Drawings without claim for additional payment.

E. Obtain all permits necessary for the execution of any work pertaining to the installation, or any operation by the Owner including any associated charges or fees.

F. Execute all work in accordance with the NEC and all applicable State and Local codes, ordinances, and regulations. If a conflict develops between the Contract Documents and the appropriate codes and is reported to the Architect prior to bid opening, the Architect will prepare the necessary clarification. Where a conflict is reported after contract award, propose a resolution of the conflict and, upon approval, perform work.

1.9 QUALITY ASSURANCE

A. Contractor's Qualifications: Firm experienced in the provision of systems similar in complexity to those required for this project; and meet the following:

1. No less than five (5) years of experience with equipment and systems of the specified types.
2. Experience with at least five (5) comparable scale projects within the last two (2) years.
3. Be a franchised dealer and service facility for the Manufacturer's products furnished.
4. Maintain a fully staffed and equipped service facility.
5. At the request of the Architect, demonstrate that:
    a. Adequate plant and equipment is available to complete the work.
    b. Adequate staff with commensurate technical experience is available

B. Manufacturer's Qualifications:
1. No less than five (5) years continuous experience in the production of specified type of product.
2. Production shall meet applicable NEMA standards.

C. Contractor shall attend pre-installation meetings to coordinate with other trades as required.

1.10 SUBMITTALS:

A. The submittal information required by the specification is to be presented complete and as submissions noted below. Submittals are a crucial and integral part of the construction process; as such the Owner's consultant will not recommend payment to the Contractor above 25% of the scheduled value of this work until all submittal information has been approved. Cost for the Owner's consultant to review secondary and re-submittals due to the Contractor's failure to include all required submittal information, or rejection of incomplete or improperly prepared submittal information will be the responsibility of the Contractor. The cost shall be based on the hourly rates of the architect and his consultants as published in their current professional fees schedules and shall also include reimbursable costs for delivery, mailing, and photocopies at direct cost plus ten percent (10%).

A. Project Submittal Part 1:
1. Provide for approval not later than thirty (30) days after issuance of Notice to Proceed and prior to commencement of Work:
    a. Section 1: A complete schedule of submittals.
    b. Section 2: A chronological schedule of Work in bar chart form. Revise and resubmit schedule as required to reflect construction progress.

B. Project Submittal Part 2:
1. Provide for approval no later than sixty (60) days after issuance of Notice to Proceed and in accordance with previously submitted submittal schedule.
    a. Section 1: Complete list of products to be incorporated within the Work (Bill of Materials). With the list of products provide a written description of how the products function as a system.
    b. Section 2: Manufacturer's data sheets for each product. Provide original Manufacturer's data sheets in order as they appear in the specification. Provide data sheets on each type of dimmer, contactor, breaker and relay module specified for use on this project. These data sheets are submitted for each product in sufficient detail to facilitate proper evaluation to the products suitability for incorporation within the Work.
    c. Section 3: Provide a copy of the UL Listing Card for each dimmer, contactor, breaker and relay module specified for use on this project. Provide UL Listing Card for each rack or assembly. Provide UL Listing Card for each wiring device specified for use on this project. Provide UL Listing Card for each type or module of lighting fixture to be provided on this project.
    d. Section 4: Provide architect and/or architect's consultant with samples of wall plate materials and colors as specified in this section.

e. Section 5: Submit Material Safety Data Sheets (MSDS) for each potentially hazardous material prior to use. Include information pertaining to the hazardous material with the MSDS.

2. Drawings:
   a. Provide computer software generated drawings using standard industry graphic standards. Hand or poorly drawn documents will not be accepted. All drawings shall be created on a computer aided drafting (CAD) system compatible with AutoCAD release 2010 or higher. Electronic files of theatrical lighting contract documents shall not be distributed for use in generating submittal documents with the exception of architectural backgrounds.
   a. Schematic Drawings. Provide drawings detailing inter- and intra-components or fabricated products, wiring, conduit and cabling diagram depicting cable types, designator and color codes. Give each component a unique designator and use this designator consistently throughout the project. All schematic/riser drawings shall be provided by the lighting control System Manufacturer.
   b. Floorplan and Section Drawings. Provide drawings showing the exact location of all installed equipment on floorplans and sections, including all walls, doors and rooms, showing exact locations of devices and equipment, including, but not limited to, dimmer racks and associated control equipment as coordinated with other electrical equipment.
   c. Rack Elevations: provide a front elevation and load schedule of each dimmer rack showing the circuit number and location of connected load.
   d. Installation Drawings. Provide drawings showing special details depicting methods and means specific to each product, assembly and each product Manufacturer's recommended installation methods and means.
   e. Conduit and Electrical Drawings. Provide floor plan drawings, including all walls, doors and rooms, showing exact power requirements and conduit sizing/routing for each system with the location of all junction boxes.
   f. Equipment Drawings. Provide drawings showing location of equipment in racks, consoles, or on tables, with dimensions; wire routing and cabling within housings; AC power outlet and terminal strip locations.
   g. Custom Enclosures and Millwork Drawings. Provide full fabrication detail drawings indicating size, material, finish and openings for equipment.
   h. Fabricated Plates and Panels Drawings. Provide complete drawings on custom fabricated plates or panels. Drawings to include dimensioned locations of components, component types, engraving information, plate material and color, and bill of material.
   i. Schedule Drawings. Provide wiring schedule drawings showing source and destination of wiring and indicating which wiring is in conduit. Junction box schedule showing type of box, size, mounting and location.
   j. Labeling Drawing. Provide representative equipment and cabling labeling scheme. Include font sizes and styles, explanation of scheme, and descriptor and designator schedule.
   k. General Detail Drawings. Provide detail drawings depicting any unique installation methods specific to each product.
   l. Template Drawings. Provide detail drawings for master house lighting touch screens stations. Note that some screens may be revised during Owner training to meet the needs of the End User.
   m. Any other pertinent data generated which is necessary to provide the Work.

C. Submittal Format:
   1. Electronic PDF submittals are encouraged.
   2. Non electronic submittals shall be bound in a three-ring D style binder sized for 150% of the material with a maximum size being a three-inch spine. Use multiple volumes if necessary.

3. Provide each submittal with a unique number and be numbered in consecutive order.
4. Provide each submittal binder with a cover and a spine reflecting the project title and submittal number. Submittals shall not be issued with other disciplines.
5. Provide each submittal with a complete table of contents with the following information:
    a. Project title and number.
    b. Submittal number. In the case of a resubmittal, use the original submittal number immediately followed by the suffix “R” immediately followed by a unique number and be numbered in consecutive order.
    c. Date of submission.
    d. Referenced addendum or change-order number as applicable.
    e. Referenced specification Section, Part, Article, Paragraph and page number or drawing reference as applicable.
    f. Index Product Data sheets by Manufacturer and model or part number.
6. Separate major grouping with labeled binder tabs.
7. Arrange product data list in alpha-numeric order when applicable followed by unspecified product arrange by Manufacturer and model or part number. Follow list by Manufacturer’s data sheets, arranged in the same order. If a data sheet shows more than one product, indicate the model being proposed with an arrow or other appropriate symbol.
8. Drawings executed at an appropriate scale, not smaller than 1/8" = 1'-0”.

D. Submittal Copies:
1. These requirements represent minimum project requirements; a project’s general conditions may require additional copies for project distribution.
2. Where non-electronic submittals are required:
    a. Submit three (3) bound prints of all drawings.
    b. Submit three (3) binders of bound materials (e.g. product submittals).
    c. Submit two (2) copies of product or sample finishes as required within this specification.

E. Resubmission Requirements:
1. Make any requested corrections or change in submittals required. Resubmit for review until no exceptions are taken.
2. Indicate any changes that have been made other than those requested.

F. Approval of Submittals: The submittal information will be reviewed by the General Contractor, Owner, Architects, Engineers, and Consultant. Each submittal package will be returned, stamped as follows:
1. “*No Exceptions Taken*”: proceed with construction; all job site coordination will be at the direction of the General Contractor.
2. “*Make Corrections Noted*”: No Resubmission Required” submittals have been returned with conditional approval. Corrections, as indicated on the returned drawings and/or specifications, must be made before construction can begin.
3. “*Make Corrections Noted*”: Submit Corrected Copy” submittals have been returned with conditional approval. Corrections, as indicated on the returned drawings and/or specifications, must be made in writing and returned to the consultant before construction can begin.
4. “*REJECTED, Submit Specified Item*” a specified item in the submittal has been rejected for the reasons noted. Re-submit in compliance with the specifications.
5. “*REJECTED, Revise and Re-submit*” submittal has been rejected for the reasons noted. Re-submit in compliance with the specifications.
6. “*No Review Action Required*” all information provided was for information or coordination purposes only. Review is not required.

1.11 PROJECT RECORD MANUAL

A. Submit three (3) bound original sets (this is a minimum of two for the Owner and one for the Architect's consultant; additional copies may be required by the project's general conditions) after substantial completion and prior to final inspection.

A. The Project Record Manual shall be segregated into three separate bindings as follows:
   1. Operations Manual:
      a. Product Data: Product actually incorporated within the Work:
         1) Manufacturer's data for each type of product conforming to the scheme above. The list shall include Manufacturer's serial numbers.
         2) Each product's Owner/Instruction Manual.
         3) For custom circuits or modifications, a description of the purpose, capabilities, and operation of each item.
         4) Manufacturer's wiring diagram for each type of product actually incorporated.
         5) Separately bound list by Manufacturer and model or part number of all products incorporated within the Work arranged in alphanumeric order.
      b. Record drawings: Final rendition of that specified depicting what is actually incorporated within the Work. Provide one (1) full size set of reproducible drawings and one (1) DVD containing all CAD generated drawings prepared in conjunction with this project. Drawing files shall be in AutoCAD Release 2010 DWG format.
      c. Test Reports: Recorded findings of testing specification of this specification.
      d. System Operation and Instructions: Prepare a complete and typical procedure for the operation of the equipment as a system, organized by subsystem or activity.
         6) This procedure should describe the operation of all system capabilities.
         7) Assume the intended reader of the manual to be technically experienced but unfamiliar with the components and the facility.
   2. Service & Maintenance Manual:
      a. Provide an original copy of the service manual on every piece of equipment for which the Manufacturer offers a service manual. Arrange manuals in the same order as the operations manual.
      a. Manufacturer's maintenance and care instructions.
      b. Maintenance Instructions: including maintenance phone number(s) and hours; maintenance schedule; description of products recommended or provided for maintenance purposes, and instructions for the proper use of these products.
   3. Warranty Manual:
      a. Manufacturer's warranty statements on each product.
      a. Date of substantial completion and ending dates for warranties for each group of products.
      b. Software registration and licenses.
   4. Include any other pertinent data generated during the Project or required for future service.
   5. Appropriately duplicate data within the separate bindings when it will reasonably clarify procedures, e.g., operational data in maintenance binding.

1.12 DELIVERY, STORAGE, AND HANDLING

A. Ship product in its original container, to prevent damaging or entrance of foreign matter.

A. Handling and shipping in accordance with Manufacturer's recommendation.

B. Provide protective covering during construction, to prevent damaging or entrance of foreign matter.

C. Replace at no expense to Owner, product damaged during storage, handling or the course of construction.

1.13 PROJECT CONDITIONS

A. Verify conditions on the job site applicable to this work. Notify Architect in writing of discrepancies, conflicts, or omissions promptly upon discovery.

A. The Drawings diagrammatically show cabling and arrangements of equipment fitting the space available without interference. If conditions exist which make it impossible to install work as shown, recommend solutions and/or submit drawings to the Architect for approval, showing how the work may be installed.

1.14 ACCEPTANCE TESTING

A. Upon completion of installation and initial tests and adjustments specified in Part 3, acceptance testing shall be performed by the Owner's Representative.

A. Provide two representatives familiar with all aspects of the system to assist the Owner's Representative during acceptance testing.

B. The process of acceptance testing the System may necessitate moving and adjusting certain component parts; perform such adjustments without claim for additional payment.

1.15 WARRANTY

A. Warrant labor and product for two (2) years following the date of substantial completion to be free of defects and deficiencies, and to conform to the drawings and specifications as to kind, quality, function, and characteristics. Repair or replace defects occurring in labor or product within the Warranty period without charge. Any cost required to complete this warranty repair is the responsibility of the Contractor.

A. All lighting control network components (i.e. routers, switches, nodes, etc.) will be covered under warranty by the lighting control Systems Manufacturer for a minimum of two (2) years following the date of substantial completion. These warranties are in addition to any specific warranties issued by Manufacturers for greater periods of time.

B. During the warranty period, the Manufacturer shall provide a toll-free 24-hour-per-day number for telephone technical support and service request. If callback is required, calls shall be answered within thirty (30) minutes.

C. Within the warranty period, Contractor and/or Manufacturer shall correct the deficiency within twenty-four (24) hours.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Model numbers and manufacturers included in this specification are listed to establish a standard of product quality.

B. Substitution of specified products with other qualified manufacturers and products will be considered providing:
   1. Proper substitution procedures outline under Division 1 is adhered to.

2. A request for substitution of each specific product must be made in writing by a bidding Contractor not less than ten (10) business days prior to bid for written approval of the Architect.
3. Sufficient data for each product is presented for prior approval including technical data, UL approval, manufacturer's specifications, samples, and, if requested, results of independent testing laboratory tests.
4. Written permission is obtained for the substitution from the Owner or Owner's Representative.

C. If proposed System includes equipment other than specified model numbers, submit a list of major items and their quantities, with a generated one-line schematic diagram for review. Include a list of previously installed projects using proposed substitute equipment that are similar in nature to the specified System.

D. Providing product not specifically specified without prior written approval by the Owner, Architect and/or Architect's Consultant shall not be accepted.

2.2 GENERAL

A. Products shall be new, free from defects and listed by UL when an applicable UL Standard exists. Provide product of a given type from one manufacturer.

A. Regardless of the length or completeness of the descriptive paragraph herein, provide product complying with the specified Manufacturers' published specifications.

B. All cable shall be compliant with NEC as applicable, and UL listed or CSA certified. UL listing must be available at the time of bid.

2.3 CABLING AND CABLING ACCESSORIES

A. DMX512 (E-DMX) distribution cable:
1. Provide 23 AWG four twisted pair data cable.
2. Pair Color Code Chart:
   a. 1 – White/Blue Stripe and Blue
   b. 2 – White/Orange Stripe and Orange
   c. 3 – White/Green Stripe and Green
   d. 4 – White/Brown Stripe and Brown
3. Insulation: Polyolefin
4. Inner/Outer Jacket Material: PVC – Polyvinyl Chloride
5. Nominal Impedance: 100 ohms.
6. Nominal Velocity of Prop.: 72%
7. Capacitance between conductors: 15.0 pF/ft.
8. Acceptable product:
   a. Belden 11872A (Category 6).

B. DMX512 Backup Control Signal Distribution Cable:
1. Provide 24 AWG two twisted pair cable.
2. Insulation: Foam polyethylene.
3. Shield: aluminum foil/polyester tape.
4. Capacitance between conductors: 12.5 pF/ft.
5. Acceptable product:
   a. Belden 9729

C. Architectural Lighting DMX Cable:
1. Provide 24 AWG two twisted pair cable.

2. Insulation: Foam polyethylene.
3. Shield: aluminum foil/polyester tape.
4. Capacitance between conductors: 12.5 pF/ft.
5. Acceptable product:
    a. Belden 9842

D. Preset Station Signal Distribution Cable:
1. Provide 16 AWG single twisted pair cable.
2. Insulation: PVC-polyvinyl chloride.
3. Shield: unshielded.
4. Capacitance between conductors: 33 pF/ft.
5. Acceptable product:
    a. Belden 8471

2.4 PRODUCTS

A. Theatrical Lighting Distribution
1. Wall-Mounted Motorized Breaker Panels (MBP)
    a. General
        1) Breaker Panels shall be UL Listed,
        2) Breaker Panels shall consist of a main enclosure with 12, 24, or 48 pole breaker subpanels, integral control electronics for low voltage terminations and provision for accessory cards
        3) The panel shall be constructed of 16-gauge galvanized steel. All panel components shall be properly treated or finished in fine-textured, scratch resistant paint
        4) The unit shall provide interior cover over the control electronics and accessory cards to allow access only to class 2 wiring and prevent direct access to class 1 line voltage components
        5) Circuits as described in schedule
        6) Breakers shall provide manual switching control while power is unavailable
    b. Each panel shall have a keypad and LCD display for rack configuration, backup, and fault indication.
    c. Panels shall employ USITT DMX-512 control format.
    d. An Ethernet connection shall provide advanced control of relays over streaming ACN (sACN) and transmit status, control override, and measured energy usage per branch circuit via an internal Web UI or central monitoring interface
    e. The panel shall have a UL924-listed contact input for use in Emergency Lighting systems.
    f. Electrical
        7) Breaker Panels shall be available to support power input from:
            a) 120/208V three phase 4-wire plus ground
        8) Breaker panels shall support main circuit breaker options:
            a) As required for functional system based on existing electrical service or Division 26 documents
    g. Breaker Panel Accessories
        9) A low voltage 0-10V dimming option shall provide up to 24 0-10v control outputs that are linked to relay circuits within the panel. Each output shall support up to 400mA of current sink per output
        10) A contact input option shall provide 24 dry contact inputs to be linked for direct or group relay control, to activate a preset, or to activate a sequence. Controller software shall allow for normally open maintained, normally closed maintained, or momentary toggle
    h. Provide all with main lug only option.
    i. Quantity: As shown in drawings
    j. Acceptable Product

11) Electronic Theatre Controls – Sensor IQ Panel
12) Lyntec - RPC Series Remote Control Breaker Panel
13) Or as approved

2. Distribution Wiring Devices
   a. General
      1) All power distribution devices overall assembly shall be listed by a nationally recognized test lab.
      2) All dimmed circuit connectors shall be 20A grounded stage pin type. All switched circuits connectors shall be 20A twistlock type. All connector types provided shall be of a single manufacture.
      3) All pigtails shall be three-wire type “SOW” rubber jackets cable. All pigtails to be provided with proper strain relief.
      4) All power distribution devices shall be fabricated from minimum 18-gauge galvanized steel and finished in black fine-textured powder coat paint unless noted otherwise. Boxes shall be free from burrs, sharp corner, and overhanging edges.
      5) Circuits for Raceways and Plugging Boxes shall be labelled with 2” yellow on black Brady numbers. Numbers shall be located so that they are no obscured by cabling. Circuits shall be assigned and labelled per schedules on drawings
      6) Circuits for Wall Boxes and Floor Pockets shall be labelled with 1” yellow on black Brady numbers. Numbers shall be located so that they are no obscured by cabling. Circuits shall be assigned and labelled per schedules on drawings. As a rule, circuits shall number Stage Left to Stage Right, Down stage to Upstage.
      7) All power distribution devices shall be provided with appropriate mounting hardware.
      8) All multi-conductor cable is to be provided with Kellems-type strain relief grips at each end of the cables with intermediate strain relief as required.
      9) Provide connector strips, gridiron junction boxes (GIJB), and associated hardware for over the stage lighting. Coordinate with the stage rigging contractor the installation of the connector strips used as electrics or lighting battens including appropriate connector strip length. Provide all multi-conductor cables allowing the devices to fly to a low trim of 60” inches. The cable is to be provided with necessary cable strain relief grips as part of the cable management system. Provide rugged network control cables to parallel the multi-conductor cable runs. Verify all electrical circuits and label all circuit numbers as specified.
      10) All circuits are to be verified, tested, and be functioning.
   a. Pipe Mounted Boxes (PB)
      11) Provide a plug box designed for pipe mounting.
      12) Construction: code gauge steel.
      13) Connectors: female 20A connectors on the end of each of the pigtails and flush mounted twistlock for relay circuits
      14) Pigtails: SO type cable. Provide lengths as shown on drawings.
      15) Circuits: number of circuits as specified on drawings.
      16) Rating: pigtails and connectors to be 20 Ampere.
      17) Labeling: circuits are labeled with yellow letters on black background.
      18) Overall assembly UL listed.
      19) Acceptable product:
         a) Altman 450 series
         b) ETC 9300 series
         c) Strand Lighting 9600 series
         d) SSRC PM series
   b. Wall Mounted Boxes (WB)
      20) Provide a wall plug-box designed for recessed mounting.

21) Construction: code gauge steel.
22) Connectors: female 20 Ampere twistlock-type connectors surface mounted in the plug-box.
23) Circuits: number of circuits as specified on drawings.
24) Rating: connectors to be 20 ampere.
25) Labeling: circuits are labeled with yellow letters on black background.
26) Overall assembly UL listed.
27) Acceptable product:
    a) Altman
    b) ETC 9200 series
    c) Strand Lighting 9600 series
    d) SSRC RM series

B. Theatrical Lighting Control
1. Control Distribution Panel (CDP)
    a. Provide wall-mounted unit to house components within as described on the drawings
    b. Provide a low profile, wall mounted NEMA 1 enclosure constructed of 16 gauge steel.
    c. Enclosure shall have a hinged, locking door of same construction.
    d. Enclosure shall be properly vented to maintain acceptable equipment operating temperature.
    e. Enclosure shall be sized to house all necessary components for the lighting control network.
    f. Provide an integrated rack rail system to accommodate adjustable and easy mounting of network components.
    g. Rails shall be constructed of 11 gauge steel with tapped 10-32 mounting holes in universal EIA spacing.
    h. Enclosure shall have cable management features including pass-through on back pan, sufficient cable tie points and knockouts on top, bottom and sides.
    i. Enclosure shall have a powder coat finish. Color per Manufacturer's standard.
    j. Enclosure shall be UL listed.
    k. Quantity and details: As shown on drawings
    l. Acceptable product:
        28) ETC DIN14 or DIN28 Enclosure
        29) Pathway 1100 Series Enclosures
2. UPS Backup Power / Surge Protection
    a. Provide a DIN mountable UPS backup to support equipment located in the control distribution racks (provide with one (1) spare battery).
    a. Output Power Capacity: 1400VA/1050W,
    b. Input 120V/ Output 120V
    c. Interface Port: DB-9 RS-232
    d. Extended runtime model
    e. Rack Height: 2 Units
    f. Filtering: Full time multi-pole noise - filtering: 0.3% IEEE surge let-through: zero clamping response time: meets UL 1449
    g. The UPS shall be provided by the lighting control system manufacturer.
    h. Quantity: As shown on drawings
    i. Provide product as manufactured by:
        1) APC
        2) Tripp Lite
3. Ethernet Switch (ESW)
    a. Provide DIN mountable network components (switch, cable, cable management, etc.) to comprise a fully functioning system.
    a. Provide Ethernet Switches in the CDP to support network connectivity required in system riser and schedule. The switch shall route DMX-512 control signals.

b. Switch shall have the following minimum network protocol and standards compatibility:
    1) IEEE 802.3 10BaseTx Ethernet
    2) IEEE 802.3u 100BaseTx Fast Ethernet
    3) IEEE 802.3ab 1000BaseTx Ethernet
    4) IEEE 802.3az Gigabit Fiber
c. Inline power 48-volt DC power is provided over Category 6 UTP cable up to 100 meters
d. 10 and 100 Mbps peak and aggregate throughput for high-performance data transfer.
e. 10/100 auto-sensing on each port detects the speed of the attached device to configure the port for 10 or 100 Mbps operation.
f. Switch shall be equipped with LED indicators for power status, port status, bandwidth utilization, collision detection, and speed indication.
g. Switch shall be sized according to system network requirements with linking available to other switches within the same rack.
h. Provide DIN rail mount kit and required hardware and cables for stacking.
i. Each network location shall have a dedicated input point on the network switch. Patching shall not be required.
j. The Ethernet switch shall be provided by the lighting control system manufacturer.
k. Quantity: As required by design.
l. Acceptable product:
    5) Antaira LNP Series
    6) Pathway VIA Series
    7) As approved.

4. Network Node/Gateway
    a. Provide rack-mounted DMX Ethernet node/Gateway to generate DMX to devices located at theatrical and house architectural lighting positions
    a. Nodes shall have (4) screw terminal or 5-pin DMX connectors for a total of 4 DMX universes for distribution over the Ethernet system.
    b. DMX Node shall have LEDs for indication of power, network activity, and DMX port configuration.
    c. Each input shall route directly to the Ethernet Switch located in the assigned Dimmer Rooms without the need for patching.
    d. Quantity: As required by design.
    e. Acceptable product:
        1) ETC rack or DIN rail mounted gateway
        2) Pathway rack or DIN rail mounted gateway
5. Control Receptacle Station (CRS)
    a. Provide a flush-mounted control station for connection of the control console (over network or hard DMX back-up) and portable house light controller.
    a. Station will contain receptacle components as described on the drawings.
    b. Station faceplates shall be .80” aluminum, finished in fine texture, scratch resistant black powder coat.
    c. Station Back box will be a minimum of 2.5 inches deep
    d. Station shall have white, silk screened graphics
    e. Provide a Lamacoid label for network jacks that denotes, using alpha-numeric labelling convention, the switch location and network port number.
    f. Each network jack shall route directly to the Ethernet switch without the need for patching.
    g. No daisy-chaining between jacks or splicing on network cabling is allowed.
6. DMX512 Distribution (DMX):
    a. Provide DMX512 distribution for connection to wiring devices in the Black Box.
    a. Modules shall provide one optically isolated DMX512 signal output capable of driving thirty-two (32) receiving devices on a single DMX line.
    b. Provide a wall plugging box designed for surface mounting.

c. Construction: code gauge steel.
d. Connectors: Neutrik 5 conductor XLR, flush mounted.
e. Circuits: located as shown on the drawings.
f. Labeling: labeled with yellow letters on black background.
g. Acceptable product:
1) ETC
2) SSRC
3) Pathway

7. Network Receptacle Station/Gateway (NET)
a. Provide a remote plug-in station for connection of control console and portable DMX Gateways at control booth and other locations as noted in the drawings.
a. Station shall be provided with a Neutrik RJ45 jack. Each jack shall be rated for use in harsh commercial conditions.
b. Station will contain the following components:
1) RJ 45 jack with punch down block, provide Neutrik EtherCon type receptacle as indicated on drawings.
2) Station faceplates shall be .80” aluminum, finished in fine texture, scratch-resistant black powder coat.
3) Station back box will be a minimum of 2.5 inches.
4) Station shall have silk screened graphics white in color.
5) Provide a Lamacoid label that de-notes, using an alpha-numeric labeling convention, the switch location and network port number.
c. These network connections shall also be configured with a back box and mounting hardware for mounting on the FOH lighting galleries or backstage.
d. Each Network jack will route directly to the Ethernet Switch located in the assigned Dimmer Rooms without the need for patching.
e. No daisy chaining between jacks or splicing of Category 5e and above cable is allowed.
f. Quantity: As depicted in drawings.
g. Acceptable product:
6) ETC Network station

C. Control Console and Accessories
1. Control Console
a. The lighting control console shall be a microprocessor-based system specifically designed to provide complete control of stage, studio, and entertainment lighting systems.
b. The system shall also be able to control third party ACN devices directly. The system shall provide control of 1,024 or 6,144 outputs on a maximum of 32,768 control channels.
c. A maximum of 10,000 cues, 999 cue lists, 1000 groups, 1000 presets, 4 x 1000 palettes (Intensity, Focus, Color and Beam), 1000 effects, 1000 macros and 100 curves may be contained in non-volatile electronic memory and stored to an onboard hard disk or to any USB storage device.
d. The console may be placed in Tracking or Cue Only mode by the user as a system default and overridden on individual record actions as required.
e. A Master Playback fader pair and dedicated Grand Master/Blackout shall be provided.
f. A high-resolution level wheel shall be provided to control intensity for selected channels and scrolling within selected displays. Four page-able high-resolution encoders shall be provided for control of other non-intensity parameters. Non-intensity parameters shall be controllable via the encoders or keypad controls, without need of an external pointing device.
g. Control and programming features for automated fixtures shall also include: a standard library of fixture profiles, the ability to copy and edit existing profiles and create new profiles, patch displays including channel and output addressing, 16-bit

fade resolution, color characterization allowing color mixing and storing in Hue and Saturation or native device values.

h. The system shall direct user input through on-screen dynamic prompts and integral LEDs on console keys indicating current operating mode. A context sensitive on-line Help feature shall explain and provide an example of the operation of each feature of the system.

i. A row of softkeys shall be provided, which change function based on the selection and context of the console. These softkeys shall be labeled via an adjacent LCD display that shows their current functions at all times. Systems using softkeys with no LCD display shall not be acceptable.

j. Console software upgrades shall be made by the user via a USB port; changing internal components shall not be required.

k. The console operating software shall be loaded into program execution memory from the internal hard drive when the console is powered. In the event of an uncontrolled shutdown, the console shall return to its last output state when power is restored.

l. Console power shall be 95 – 240V AC at 50 or 60Hz, supplied via a detachable power cord.

m. Provide (2) external touchscreens high resolution DVI monitors that will display system information, including playback status, live output and blind values for all record targets.

n. Provide (1) fully-functioning, detachable alphanumeric keyboard. The keyboard shall allow labeling of channels, cues, presets, groups, palettes, effects, macros, curves and the show. An integral electronic keyboard shall be provided.

o. Provide with dust cover

p. Provide with USB mouse

q. Provide with 25’ Network control cable

r. Provide (1) Littlite with 3-pin XLR connector

s. Provide (1) USB jump drive, minimum 8gb

t. Quantity (1)

u. Acceptable product:

7) Electronic Theater Controls Element 2 with 1,024 channels of control

2. Handheld Remote Focus:

a. The portable access unit shall be a wired or wireless remote-control device that allows access to console programming and playback functions.

a. The device shall be an 8-inch tablet with a capacitive multi-touch display.

b. Remote unit shall connect through an RJ45 and wirelessly via a WAP

c. Contractor shall provide WAP that meets District standards for WiFi function and security

d. Contractor shall provide the following accessories:

1) Charging/cable Adaptor
2) Hand Strap.
3) Shoulder Strap
4) EETI Stylus Pen
5) Office Dock
6) VESA Dock

e. Acceptable product:

1) Electronic Theatre Controls ETCpad
2) Strand Lighting Remote Focus Unit

D. Portable Fixtures and Accessories

1. LED Spot Fixture

a. Provide a color mixing high-intensity LED illuminator with DMX controlled intensity and color;

b. Unit shall utilize (60) Luxeon® Rebel LED emitters rated at 54,000 hr. LED life;

c. Unit shall be ETL rated for indoor dry location use;

d. The fixture shall be constructed of rugged, die-cast aluminum, free of burrs and pits. Provide with impact knobs and handles. Body shall be finished with black, high temperature epoxy paint;
e. Unit shall be constructed in a manner to allow tool free maintenance of lamp alignment and cleaning of reflector or lens;
f. Unit shall have up to four shutters with user-friendly shutter-lock system;
g. Color: black housing;
h. Provide yoke and hanging bracket mounting for each fixture;
i. Optical system: molded borosilicate, ellipsoidal reflector and aspheric lens to produce an optimum cosine field. Unit shall have projector-like quality pattern imaging, sharp shutter cuts without halation, and allow for both hard and soft beam edges;
j. Unit shall operate at 100V to 240V 50/60 Hz and utilize an internal power supply;
k. Unit shall contain Neutrik® PowerCon™ input connector and a 5' power lead to a twistlock connector;
l. Color: RGB-L color array. Color to have droop compensation to maintain color accuracy and be optically calibrated to ensure consistency across fixtures;
m. Control: DMX in and thru via 5-pin XLR connectors; 5 channel control (3 color plus intensity and strobe);
n. Provide the following quantity of lens tubes:
7) (6) 36º;
8) (24) 50 º;
o. Provide with (1) power pass-through cable and (1) 10' DMX cable for each fixture;
p. Provide (1) 5-pin XLR terminator for every (5) fixtures
q. Quantity (24)
r. Acceptable product:
9) ETC ColorSource Spot Deep Blue

2. LED Wash Fixture
a. Unit shall be integrally designed LED wash fixture.
a. Unit shall utilize (40) Luxeon® Z LED emitters rated at 20,000 hr. LED life
b. Unit shall be ETL rated for indoor dry location use.
c. Construction: Rugged all-metal extruded housing with advanced thermal management systems for long LED life
d. Unit shall allow for easy access slots for secondary lenses; combine secondary lenses for desired beam spread.
e. Provide with NSP, MFL, WFL lens for each fixture.
f. Color: black housing
g. Provide yoke and hanging bracket mounting for each fixture.
h. Unit shall operate at 100V to 240V 50/60 Hz and utilize an internal power supply.
i. Unit shall contain Neutrik® PowerCon™ input connector and a 5' power lead to a twistlock connector.
j. Provide with (1) power pass-through cable and (1) 10' DMX cable for each fixture.
k. Provide (1) 5-pin XLR terminator for every (5) fixtures
l. Color: RGB-L color array. Color to have droop compensation to maintain color accuracy and be optically calibrated to ensure consistency across fixtures.
m. Control: DMX in and thru via 5-pin XLR connectors; 5 channel control (3 color plus intensity and strobe)
n. Quantity (28)
o. Acceptable product:
1) ETC ColorSource PAR Deep Blue

3. Extension Cables:
a. Provide extension cables for extending pigtail or wall box circuits to lighting instrument.
a. Provide cable and connectors which meet or exceed the quality of cables and connectors set forth in this specification.
b. Provide each cable with Velcro cable tie.

c. Provide extension cable assemblies consisting of 12-gauge, 3 conductor flexible cable and 20A rated male and female grounded twist-lock connectors.
d. Quantity:
    1) (10) @ 5 ft.
    2) (5) @ 10 ft.
    3) (2) @ 25 ft.
    4) (1) @ 50 ft.
e. Acceptable Products:
    5) TMB & Associates ProPower
    6) Lex Products PowerFLEX
    7) Or approved equal

4. Adapter Cables
    a. Provide adapter cables for extending pigtail or wall box circuits to lighting instrument.
    a. Provide cable and connectors which meet or exceed the quality of cables and connectors set forth in this specification.
    b. Provide each cable with Velcro cable tie.
    c. Provide extension cable assemblies consisting of 12-gauge, 3 conductor flexible cable and 20A rated male Edison connectors and female grounded twist-lock connectors.
    d. Quantity:
        1) (10) @ 1ft.
    e. Acceptable Products:
        2) TMB & Associates ProPower
        3) Lex Products PowerFLEX
        4) Or approved equal
5. Two-fers:
    a. Provide “Y” cables to connect two fixtures to a single receptacle.
    a. Provide cable and connectors, which meet or exceed the quality of cables and connectors set forth in this specification.
    b. Provide adapter assemblies consisting of 12-gauge, 3 conductor flexible cable and connectors of same specifications found in this section.
    c. Quantity:
        1) (5) two-fer cables.
    d. Acceptable Products:
        2) TMB & Associates ProPower
        3) Lex Products PowerFLEX
        4) Or approved equal
6. Flexible Category 5e Cable/NET Cable:
    a. Provide extra rugged, flexible control cable (Ethernet) for connection of NET stations to portable Network Nodes.
    a. Cable to be 4-pair, double shielded, low-capacitance.
    b. Conductors: 24 AWG tinned, annealed copper stranded 7 x 0.16.
    c. Connector: Provide with EtherCon connector by Neutrik
    d. Assembly: pairs cabled with Kevlar strength member.
    e. Shield: (inner) aluminum/Mylar, 100% coverage (outer) tinned copper braid, 80% coverage.
    f. Conductivity: 15ohms per 100 meters @ 20C.
    g. Impedance: 100 ±15 ohms 1-100 MHz
    h. Quantity:
        1) (5) 3’ Ethernet Cable
        2) (5) 10’ Ethernet Cable
        3) (1) 25’ Ethernet Cable
    i. Acceptable Products:
        4) TMB & Associates ProPlex
        5) Lex Products PowerFLEX

6) Or approved equal

7. DMX-512 cable
   a. Provide DMX-512 cables for connecting lighting consoles, moving lights, or other DMX controlled accessories to the Network Nodes.
   a. Connectors shall be Neutrik 5-pin.
   b. Provide 24AWG two twisted pair data cable.
   c. Insulation: polyethylene.
   d. Nominal Impedance: 100 ohms.
   e. Nominal Velocity of Prop.: 78%.
   f. Capacitance between conductors: 12.5 pF/ft.
   g. Quantity:
      1) (10) 5’ DMX Cable
      2) (5) 10’ DMX Cable
      3) (5) 25’ DMX Cable
      4) (1) 50’ DMX Cable
   h. Acceptable Products:
      5) TMB & Associates ProPlex
      6) Lex Products PowerFLEX
      7) Or approved equal
8. Beam Control Medium Sheets
   a. Provide clear beam angle control medium for LED wash
   a. Beam control medium shall be clear polycarbonate with flame retardant additive
   b. Provide (12) full size seamless sheets (24”x40”) of beam control medium
   c. Acceptable product:
      1) Rosco Opto-Sculpt
9. Tie Line
   a. Product will be a cotton line with polyester core
   a. The blend will be a diamond braid construction
   b. Product will be Black in color
   c. Product will be unglazed
   d. Product will be 1/8” in diameter
   e. Product will be on original spool or reel
   f. Provide 100’-0” spool
      1) Cut into 24” ties for dressing cable used in repertory plot
      2) Furnish the remainder of unused spool to Owner
   g. Acceptable product:
      3) Rose Brand #4 Tie Line
      4) Or approved equal
10. XLR DMX Terminator
   a. Provide XLR DMX male terminator
   a. Connector shall be Neutrik 5-pin.
   b. Termination resistance: 120 ohms +/- 10% between pins 2 and 3
   c. Termination power capacity: 2 watts
   d. Quantity: (5)
   e. Acceptable Product
      1) ETC SGE 1507
      2) Lex Products DMX5P-TERM
11. Pattern Templates for Ellipsoidal Spotlights:
   a. Provide five (5) stainless steel patterns as selected by the Owner.
   a. Size for ellipsoidal spotlights.
   b. Acceptable product(s):
      1) Rosco Stainless Steel Gobos

PART 3 - EXECUTION

3.1 GENERAL

A. Coordinate incorporation of the Work specified herein with other project work so as to facilitate a cohesive final product.

B. Mount equipment and enclosures plumb and level.

C. Permanently installed equipment to be firmly and safely held in place.

3.2 INSTALLATION OF CABLE AND WIRING

A. Coordinate all electrical work with the Electrical Contractor. Provide all necessary equipment, including hardware and apparatus, for complete connection of power system wiring.

A. Coordinate installation of power and ground wiring to equipment. Power and ground wiring will terminate inside of equipment and/or junction boxes and be hardwired to ground buss and circuit breaker to ensure uninterrupted operation.

B. All control wiring will be executed in adherence to USITT standard control systems practices including the following:
   1. Isolate cables carrying signals at different levels and separate to restrict interaction.
   2. Keep wiring separated into three groups of conduit provided for control circuits, power circuits (up to 50 amps), and feeder circuits (above 50 amps).
   3. Isolate all wiring, except for safety ground wiring, from conduit ground.
   4. Take such precautions as are necessary to prevent and guard against electromagnetic and electrostatic interference in other technical systems (such as sound and communications systems) in the facility. Where possible all devices and wiring will be enclosed in a shielded environment. Take care not to use shields (conduits) and grounds as current carrying return paths for lamp and relay coil commons. All ground references are to be made to the building electrical system ground.
   5. Label unused wiring provided for spares or future systems and terminate at screw terminal strips.
   6. All joints and connections will be made with resin-core solder or with ratchet jaw crimp type mechanical connectors. Connect all circuits electrically in phase using same wire color code for similar circuits throughout the project.

3.3 INSTALLATION OF CONNECTORS, PLATES AND PANELS

A. Install panel mounted connectors rigidly attached to panels, plumb and level.

A. Custom connector plates are typically stainless steel, unless otherwise noted or specified. However, it is the Contractor’s responsibility to verify plate finish with the Architect.

3.4 INSTALLATION OF EQUIPMENT HOUSING

A. Prewire and test equipment cabinets before delivery to job site.

A. Provide adequate ventilation in cabinet mounted equipment to keep temperature in the cabinet below 110º F. Install additional ventilation fans if necessary to attain a temperature below 110º F.

B. Power to be distributed within dimming and distribution system provided by Contractor.

3.5 INSTALLATION OF EQUIPMENT

A. Take appropriate precautions against electrostatic discharge (ESD) when installing electronic equipment. Establish a personal ground before handling electronic equipment through the use of a grounded wrist wrap and/or an anti-static floor pad.

A. Take appropriate precautions to protect the equipment from damage during installation. Equipment to be installed free of damages, scratches, dents, etc.

B. Mount equipment plumb and level, firmly, and safely held in place.

C. All equipment will be installed in compliance with applicable Local and National codes and regulations. Equipment will also be installed in accordance with Manufacturer's recommendations and specifications. Prior to initial energizing, the system will be inspected by a representative of the Manufacturer as outlined under Contractor Commissioning.

D. Install lighting fixtures using standard stage-industry practices. Do not use bare hands when handling lamps; keep lamps free of body oil. All lamps, lenses and reflectors will be installed free of dirt, dust, and finger smudges. Ensure that a safety cable is properly used with each fixture.

E. Install lighting instruments to the "standard house hang" as directed by Owner and/or Architect's Consultant. Contractor shall document location of each type of distribution device and circuiting and place plot on gator foam board. Provide three copies: two (2) copies to client and one (1) copy to theatrical consultant.

3.6 LABELING OF EQUIPMENT

A. Create a lettering template for marking lighting and other instruments that depicts the initials or name of the Owner or facility. Coordinate exact lettering with Owner. Letters to be a minimum of 1" sans-serif text. A properly rated spray paint compliant with applicable codes will be used with template to label equipment. Coordinate color of paint with Owner.

A. Lighting fixtures will be marked visibly on housing, follow spots will be marked on the underside of housing, and lighting trees will be marked on the bottom of the bases. Coordinate and verify location of lettering with Owner.

B. Use proper measures to ensure that the lettering is clear and that the surface area of the equipment is free of overspray.

C. Provide Owner with lettering template upon completion of the project for future use by Owner.

3.7 CONTRACTOR COMMISSIONING

A. Prior to energizing or testing the System ensure the following:
   1. Products are installed in proper and safe manner according to Manufacturer's instructions.
   2. Dust, debris, solder splatter, etc. is removed.
   3. Cable is dressed, routed, and labeled; connections are consistent with regard to polarity.
   4. Labeling has been provided in compliance with specification and/or Owner.
   5. Temporary facilities and utilities have been properly disconnected, removed and disposed of off-site.
   6. Products are neat, clean and unmarred and parts securely attached.

7. Broken work, including glass, raised flooring and supports, ceiling tiles and supports, walls, doors, etc. have been replaced or properly repaired, and debris cleaned up and discarded. The jobsite shall be broom clean.
8. Retain the services of a qualified engineer regularly employed by the System Manufacturer to check the installation and ensure its proper operation. No part of the Theatrical Lighting System may be energized before this engineer has checked and approved the System installation. Failure to observe this provision will automatically relieve the Manufacturer of any responsibility concerning the proper operation of the system or any part thereof and the replacement of parts which may have been damaged by the premature energizing. The engineer will be promptly available at the job site within (21) days of written notice by the Contractor to the Manufacturer.
9. All dimmers, relays and motorized breakers are to be tested.
10. Contractor shall provide circuit tester with the appropriate type of connectors so that circuits can be tested at random.
11. Contractor shall have available three UHF or VHF walk-talkies for use by the consultant during the inspection and testing of the lighting control system.

3.8 ACCEPTANCE

A. Upon completion of installation, initial adjustments, tests and measurements specified in Part 3, and submission and review of the results, a final inspection and test will be observed by the Architect's consultant no earlier than two weeks after receipt of the written results.

A. Acceptance testing will include operation of each major system and any other components deemed necessary. Contractor will assist in this testing and provide any test equipment required specified herein. Contractor shall provide at least two (2) technicians available for the entire testing period (day and night), to assist in tests, adjustments, and final modifications. Tools and material required to make any necessary repairs, corrections, or adjustments shall be furnished by the Contractor. Testing process is estimated to take a minimum of one (1) day.

B. Provide the following test gear:
1. Circuit Tester with adapters for Stage Pin, Twist-lock and Edison connectors
2. DMX Tester
3. LinkCheck Ethernet Tester
4. Ethernet Length Meter

C. The process of testing the System may necessitate moving and adjusting certain components such as signal processors.

D. Perform tests and provide required test equipment, tools and material required to make any necessary repairs, corrections, or adjustments.

E. The following procedures will be performed on each System:
1. Inspection of the means and methods employed to incorporate the System within the facility.
2. Verification of proper operation, from controlling devices to controlled devices.
3. Verification of proper adjustment, balance, and alignment of equipment for optimum quality and to meet the Manufacturer's published specifications. Establish and mark normal settings for each level control, and appropriately record these settings within the Record Documents.
4. Other tests on equipment or systems deemed appropriate.

F. In the event the need for further adjustment or work becomes evident during testing, the Contractor is to continue his work until the System is acceptable at no addition to the contract price. If approval is delayed because of defective equipment, failure of equipment or installation to meet the requirements of these specifications and any extension of the inspection and testing

period is required, the contract price will be reduced for the additional time and expenses of the Owner, Architect and Consultant, at the standard rate in effect at that time plus all reimbursable expenses.

3.9 INSTRUCTION OF OWNER PERSONNEL

A. Provide operations and service training on the following major equipment components and subject matter:
   1. Motorized breaker panel and architectural lighting control (4 hours)
      a. Basic testing and control
      b. Normal operations
      c. Programming memory
      d. Software configurations and upgrades
   2. Training time shall consist of a minimum of (2) four-hour days in separate sessions separated by some weeks, in accordance with Owner's schedule. It is essential that the trainer be able to discuss interfacing to the audio-visual system.
   3. Control Console (12 hours.)
      a. Training shall consist of three types:
         1) Operational training
         2) Patching and programming.
         3) Applications interface for retrieving information from the control console
         4) Upgrades

B. Training will not be required where the item of equipment is Owner furnished, part of an option that is not selected, or an item of equipment that is not actually purchased.

C. Training Schedules
   1. Training should be assumed to take place on the project site, unless agreed to by the Owner.
   2. Training should be scheduled to be non-overlapping.
   3. Actual training schedule shall be by agreement with Owner. Do not assume that training will occur over 8 hour days. It is more likely that training will be scheduled in 4 to 6 hour increments; perhaps over a period of weeks (or even months).
   4. In the event that a portion of the training time is occupied in troubleshooting the equipment installation, then the training time shall be extended an equal amount of time.

D. The following is a general idea of the training "curriculum":
   1. A general familiarization of the device(s).
   2. An explanation of how the device(s) interfaces to the rest of the lighting control system.
   3. General training on operating the device(s).
   4. Specific training on device(s) operation.
   5. Saving information; backing information up.
   6. Basic troubleshooting
   7. Specific troubleshooting (this information may be conveyed to personnel other than the device's "operators").
   8. How to upgrade software; precautions taken while doing (e.g. backing-up existing software).

E. Submit an outline of the course with sample instructional aides for approval thirty (30) days prior to scheduled instruction sessions to architect and architect's consultant.

F. Contractor shall attend one event of the facility.
   1. Event Attendance includes the following requirements:
      a. Be present at the first publicly scheduled event as directed by the Owner.
      b. During theis event, attendance shall begin at the first crew call and conclude when the crew is released. During these events perform such tasks (e.g. assistance with

patching, programming, troubleshooting cabling problems, etc.) as requested by User. Tasks shall be strictly assistance, not operation.

c. In the event that the system is used prior to final acceptance, attendance in support of system usage shall not be construed as acceptance, or as event attendance.

2. Coordinate these schedules with the Owner.

G. Following discussions with Owner, formally submit a Training and Event Attendance submittal 2-4 weeks prior to first training. Submittal shall:

1. Include a separate page/entry for every training session.
2. Indicate date, time, and approximate length of training session.
3. Indicate person(s) conducting training.
4. Indicate whether training will be videotaped.
5. Intended curriculum and most appropriate attendees (e.g. engineer, operations, IT, etc.)
6. Include signature and title lines for
   a. Owner acknowledging and accepting training schedule. Include both an Accepted and Rejected box. An alternate schedule time should be suggested by the Owner in the event the schedule is rejected.
   b. Countersigning by trainer indicating that training actually occurred.
   c. All persons attending training. Where attendees do not stay for the entire session, this should be noted on the form and initialed by Owner's representative attending training.
   d. Owner's representative attending training at the end of the session shall initial that:
      5) Training Occurred.
      6) Training Materials were provided and left with Owner
      7) Training was not interrupted or shortened by equipment or system troubleshooting. If it is, then there should be a line where Owner and Contractor can indicate when make-up training will be provided and how long it should be.
      8) Training was generally sufficient for the proposed curriculum.
7. Include Notes section for Owner and Contractor to note any issues during training (areas requiring further development, etc.)

H. Following training occurrence, submit completed training records no later than 5 days following end of training. When training is conducted over a period of weeks, completed training submittals shall be consolidated into a single submittal and submitted every 2 weeks.

END OF SECTION 11 61 62

SECTION 11 81 29 - FACILITY FALL PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Roof anchors.
   2. Horizontal lifeline systems.
   3. Ladder safety systems.
   4. Safety railings and gates.

1.3 ABBREVIATIONS AND ACRONYMS

A. HLL: Horizontal Lifeline.

B. IWCA: International Window Cleaning Association.

C. RDS: Rope Descent System.

1.4 REFERENCE STANDARDS

A. 29 CFR 1910 - Occupational Safety and Health Standards; Current Edition.

B. 29 CFR 1910.23 - Ladders; Current Edition.

C. 29 CFR 1910.27 - Scaffolds and Rope Descent Systems; Current Edition.

D. 29 CFR 1910.29 - Fall Protection Systems and Falling Object Protection - Criteria and Practices; Current Edition.

E. 29 CFR 1910.140 - Personal fall protection systems; Current Edition.

F. 29 CFR 1910.66 - Powered Platforms for Building Maintenance; Current Edition.

G. 29 CFR 1926 - Safety and Health Regulations for Construction; Current Edition.

H. 29 CFR 1926.502 - Fall protection systems criteria and practices; Current Edition.

I. 29 CFR 1926.1053 - Ladders; Current Edition.

J. ACI 318 - Building Code Requirements for Structural Concrete; 2019 (Reapproved 2022).

K. AISC 360 - Specification for Structural Steel Buildings; 2022.

L. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements; 2008 (Reaffirmed 2018).

M. ANSI/ASSP A10.32 - Personal Fall Protection Used in Construction and Demolition Operations; 2012.

N. ANSI/ASSP Z359.11 - Safety Requirements for Full Body Harnesses; 2021.

O. ANSI/ASSP Z359.12 - Connecting Components for Personal Fall Arrest Systems; 2019.

P. ANSI/ASSP Z359.15 - Safety Requirements for Single Anchor Lifelines and Fall Arresters for Personal Fall Arrest Systems; 2014.

Q. ANSI/ASSP Z359.16 - Safety Requirements for Climbing Ladder Fall Arrest Systems; 2016.

R. ANSI/ASSP Z359.18 - Safety Requirements for Anchorage Connectors for Active Fall Protection Systems; 2017, with Errata (2021).

S. ANSI/IWCA I-14 - Window Cleaning Safety Standard; 2001.

T. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

U. ASTM A6/A6M - Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling; 2023.

V. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

W. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.

X. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

Y. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

Z. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2024.

AA. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2018.

BB. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2023.

CC. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2021.

DD. ASTM A554 - Standard Specification for Welded Stainless Steel Mechanical Tubing; 2021.

EE. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

FF. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2020.

GG. ASTM A1023/A1023M - Standard Specification for Carbon Steel Wire Ropes for General Purposes; 2021.

HH. ASTM B241/B241M - Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube; 2022.

II. ASTM B429/B429M - Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube; 2020.

JJ. ASTM B483/B483M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Tube and Drawn Pipe for General Purpose Applications; 2021.

KK. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

LL. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2021.

MM. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2023.

NN. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2023.

OO. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.

PP. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).

QQ. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2014, with Errata (2020).

RR. AWS D1.6/D1.6M - Structural Welding Code - Stainless Steel; 2017, with Amendment (2021).

SS. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

TT. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.

UU. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate installation of roof anchors with roofing manufacturer to verify installation will result in a warrantable building envelope.

1.6 SUBMITTALS

A. Refer to Section 01 33 00 - Submittal Procedures for submittal procedures.

B. Product Data:
   1. Provide manufacturer's data sheets on each ladder safety system product to be used, including installation instructions.
   2. Material, equipment, and fixture lists. Manufacturer’s catalog data indicating the sizes, descriptions, capacities, test certifications, and other descriptive data showing in sufficient detail that product complies with contract requirements. Equipment and performance data including but not limited to lifeline anchors, safety tieback anchors, and lifeline cable.

C. Shop Drawings:
   1. Installation drawings showing locations and types of anchorage points for personal fall protection systems and building maintenance equipment.
   2. Detail mounting, securing, and flashing of roof-mounted items to roof structure. Indicate coordination requirements with roof membrane system.
   3. Indicate anchorage details and quantity, diameter, and depth of penetration of anchors.

D. Certificates:
   1. Certify that products of this Section meet or exceed specified requirements.
   2. Certify compatibility of all products installed under this Section with roofing system.

E. Delegated Design Documents: Drawings and calculations sealed by Designer for fall protection system, indicating compliance with performance requirements and design criteria.

F. Test Report: Indicating completion of proof load testing on installed systems.

G. Manufacturer's Installation Instructions: Instructions indicating recommended method and sequence of installation for lifeline anchors, safety tieback anchors, energy-absorbing devices, and lifeline cable.

H. Designer's qualification statement.

I. Manufacturer's qualification statement.

J. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated within the previous 12 months.

K. Installer's qualification statement.

L. Testing agency's qualification statement.

M. Operation Data: Provide operating instructions and identify unit limitations.

N. Maintenance Data: Include parts list and maintenance requirements for equipment.

1.7 QUALITY ASSURANCE

A. Designer Qualifications: Perform design under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least five years of documented experience.

C. Welder Qualifications: Welding processes and welding operators qualified within previous 12 months.

D. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

E. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of type specified in this section.

1.8 WARRANTY

A. Refer to Section 01 77 00 - Closeout Procedures and Checklist for additional warranty requirements.

B. Extended Correction Period: Correct defective work within 2-year period commencing on Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ROOF ANCHORS

A. Manufacturers:
   1. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
      a. Guardian Fall Protection: www.guardianfall.com.
      b. Pro-Bel Enterprises Ltd: www.pro-bel.ca.
      c. Summit Anchor Company: www.summitanchor.com.
   2. Substitutions: Refer to section 01 25 00 - Substitution Procedures.
      a. Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution.

B. Application:
   1. OSHA and ANSI one person PPE anchor.

C. Description:
   1. Roof anchorage points for personal fall protection systems; used exclusively for employee fall protection and independent of any anchorage used to suspend employees or platforms on which employees work.
      a. Anchor Type per ANSI/ASSP Z359.18: Type T.
   2. Roof anchorage points for primary suspension lines for bosun's chairs, work cages, and suspended platforms used for window washing or facade access.

D. Structural Performance: Provide safety tieback anchors capable of withstanding design loads as required by governing regulations and codes.

E. Design Criteria: Fall protection anchors.
   1. Comply with 29 CFR 1910.140 and 29 CFR 1926.502 for personal fall protection systems and anchorage.
   2. Comply with 29 CFR 1926, Subpart M-Fall Protection.
   3. Comply with ANSI/ASSP Z359.18 test requirements for static strength, dynamic strength, residual strength, serviceability, and corrosion of anchorage.

F. Design Criteria: Primary suspension lines.

G. Provide permanent labels with manufacturer's name, serial number, manufacturing date, and reated load on roof anchors.

H. Anchors:
   1. Type: Vertical foam-filled steel pier and baseplate with galvanized forged steel loop.
      a. Loop Diameter: 1-3/8 inch.
      b. Pier:
         1) Height: 12 inches.
         2) Diameter: 3-inch OD.
         3) Wall Thickness: Schedule 40.
         4) Material: Hot-dip galvanized steel pipe.

5) Foam: Polyurethane. ASTM E84 Class I.
6) Threaded vent hole with stainless steel plug.

I. Anchor Installation:
1. Type: Cast-in-place.
2. Anchor Substrate: Existing concrete deck.
3. Roofing Material: As indicated on drawings.
4. Flashing Material: Premolded pipe flashing, membrane flashing, or sealant acceptable to roof manufacturer.

2.2 HORIZONTAL LIFELINE SYSTEMS

A. Manufacturers:
1. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work
a. 3M Personal Safety Division: www.3M.com/FallProtection.
b. Guardian Fall Protection: www.guardianfall.com.
c. Pro-Bel Enterprises Ltd: www.pro-bel.ca.
d. Super Anchor Safety: www.superanchor.com.
2. Substitutions: Refer to section 01 25 00 - Substitution Procedures.
a. Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution

B. Description: A system comprised of a flexible line such as wire rope or cable, with connectors at both ends to secure it horizontally between two anchorages or anchorage connectors.

C. Structural Performance: Provide fall-arresting lifeline systems capable of withstanding design loads as required by governing regulations and codes.

D. Design Criteria:
1. Comply with ANSI/ASSP Z359.12.
2. Comply with ANSI/ASSP Z359.15.
3. Comply with 29 CFR 1926.502.
4. Comply with ANSI/ASSP A10.32.

E. Wire Rope: ASTM A1023/A1023M, 7x7 galvanized wire , 5/16 inch diameter.
1. Stainless Steel Rigging Components: Consisting of turnbuckles, cable clamps, spring energy absorbers, absorber couplers, eye thimbles, bolts, and connector O-rings as required to make a complete and functional HLL system compatible with installed anchors.

2.3 LADDER SAFETY SYSTEMS

A. Climbing Ladder Fall Arrest System (CLAFS):
1. Manufacturers:
a. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
1) 3M Personal Safety Division: www.3M.com/FallProtection.
2) MSA Safety Incorporated: www.msasafety.com.
b. Substitutions: Refer to section 01 25 00 - Substitution Procedures.
1) Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution.
2. Description: Climbing ladder fall arrest system allows worker to climb up and down using both hands; does not require employee continuously, hold, push, or pull any part of system while climbing.

3. Comply with 29 CFR 1910.29, 29 CFR 1926.1053, Section 7 of ANSI A14.3 and ANSI/ASSP Z359.16.
4. Install on new fixed ladders over 24 feet in height.
5. Anchorage: Fixed ladder meeting requirements of 29 CFR 1910.23.
6. Flexible Carrier: Fixed 3/8-inch diameter stainless steel wire rope lifeline with shock absorber and top, bottom, and intermediate supports, meeting requirements of ANSI/ASSP Z359.16.
    a. Provide with stainless steel extension post at top of ladder, meeting requirements of ANSI/ASSP Z359.16.
7. Rigid Carrier: Fixed 304 stainless steel U-shaped slotted track with top, bottom, and intermediate supports, meeting requirements of ANSI/ASSP Z359.16.
    a. Provide with stainless steel extension post at top of ladder, meeting requirements of ANSI/ASSP Z359.16.
8. Fall Arrester: Stainless steel and aluminum automatic pass-through carrier sleeve fall arrester meeting requirements of ANSI/ASSP Z359.15 and ANSI/ASSP Z359.16; compatible with carrier.
    a. If designed to be removable from carrier, arrester removable only by at least two deliberate manual action(s) by user.
    b. Includes an anti-inversion device to prevent installation of carrier sleeve upside down on carrier.
    c. Carrier sleeve movement is automatic and does not require continuous manual intervention during climbing or descending.
    d. Includes panic grab (secondary locking mechanism) feature.

B. Ladder Safety System:
1. Manufacturers:
    a. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
        1) Guardian Fall Protection: www.guardianfall.com.
        2) Honeywell International, Inc: www.honeywell.com.
        3) Sellstrom Manufacturing Company: www.fallprotection.com.
    b. Substitutions: Refer to section 01 25 00 - Substitution Procedures.
        1) Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution.
2. Description: Ladder safety system allows the worker to climb up and down using both hands; does not require the employee continuously, hold, push, or pull any part of the system while climbing.
3. Comply with 29 CFR 1910.29, 29 CFR 1926.1053, and Section 7 of ANSI A14.3.
4. Install on new fixed ladders over 24 feet in height.
5. Anchorage: Fixed ladder meeting requirements of 29 CFR 1910.23.
6. Flexible Carrier: Fixed 3/8-inch diameter stainless steel wire rope lifeline with shock absorber and top, bottom, and intermediate supports.
    a. Provide with stainless steel extension post at top of ladder.
7. Rigid Carrier: Fixed 304 stainless steel U-shaped slotted track with top, bottom and intermediate supports.
    a. Provide with stainless steel extension post at top of ladder.
8. Fall Arrester: Stainless steel automatic pass-through carrier sleeve fall arrester; compatible with carrier.

C. Personal Fall Arrest System Components; 29 CFR 1910.140:
1. Manufacturers:
    a. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.

1) Honeywell International, Inc: www.honeywell.com.
2) 3M Personal Safety Division: www.3M.com/FallProtection.
3) MSA Safety Incorporated: www.msasafety.com.

b. Substitutions: Refer to Section 01 25 13 - Product Substitution Procedures.
1) Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution.

2. Body Support: Full body harness meeting requirements of ANSI/ASSP Z359.11; equipped with front or hip D-rings for attachment to climbing ladder fall arrest system.
3. Connecting Means: Connecting hardware, such as a locking carabiner, meeting requirements of ANSI/ASSP Z359.12; compatible with fall arrester and body support harness.

2.4 PERMANENT SAFETY RAILINGS AND GATES

A. Manufacturers:
1. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
a. Garlock Safety Systems: www.garlocksafety.com.
b. Guardian Fall Protection: www.guardianfall.com.
c. Kee Safety, Inc: www.keesafety.com.
d. Pro-Bel Enterprises Ltd: www.pro-bel.ca.
2. Substitutions: Refer to section 01 25 00 - Substitution Procedures.
a. Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution.

B. Basis of Design:

C. Steel or Aluminum Safety Railings and Gates: Refer to Section 05 52 00 - Metal Railings.

D. Design Criteria:
1. Railing: Comply with 29 CFR 1910.29 and 29 CFR 1926.502 for fall protection.
2. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of applicable regulations.
3. Distributed Loads: Design railing assembly and attachments to resist distributed force of 75 pounds per linear foot applied to the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935
4. Concentrated Loads: Design railing assembly and attachments to resist a concentrated force of 200 pounds applied at any point on the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935

E. Railing Dimensions: Refer to Drawings for configurations and heights.
1. Top Rails: 1-1/2-inch diameter, round.
2. Intermediate Rails: 1-1/2-inch diameter, round.
3. Posts: 1-1/2-inch diameter, round.

F. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable, provide flush countersunk fasteners.
1. Posts: Provide adjustable flanged brackets.
2. Surface Mounting Bases: Provide zip bases.

G. Posts and Rails: Galvanized steel tubing.

H. Gate: Same material as railing; automatic closing with latch.

I. Finish: Manufacturer's standard, factory-applied finish.

2.5 NON-PENETRATING SAFETY RAILINGS

A. Manufacturers:
   1. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
      a. Kee Safety, Inc: www.keesafety.com.
   2. Substitutions: Refer to section 01 25 00 - Substitution Procedures.
      a. Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution.

B. Basis of Design:
   1. Kee Guard Safety Rail manufactured by Kee Safety, Inc.

C. Design Criteria:
   1. Railing: Comply with 29 CFR 1910.29 and 29 CFR 1926.502 for fall protection.
   2. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of applicable regulations.
   3. Distributed Loads: Design railing assembly and attachments to resist distributed force of 75 pounds per linear foot applied to the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935
   4. Concentrated Loads: Design railing assembly and attachments to resist a concentrated force of 200 pounds applied at any point on the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935

D. Railing Dimensions: Refer to Drawings for configurations and heights.
   1. Top Rails: 1-1/4 inch diameter, round.
   2. Intermediate Rails: 1-1/4 inch diameter, round.
   3. Posts: 1-1/4 inch diameter, round.

E. Roof Edge Protection: Provide freestanding KeeGuard Roof Edge Protection System, including pipe railings, uprights, bases, counterweights and fittings
   1. Freestanding counterweighted guardrail system with 42 inch minimum height to provide a pedestrian egress barrier on the roof to withstand a minimum load of 200 lb in any direction to the top rail per OSHA Regulation 29 CFR 1910.23.
   2. Pipe: Steel, 1-1/4 inch schedule 40, galvanized.
   3. Tube: Galvanized tube, 12 gauge, 1-1/2 inches, 1.90 inches OD
   4. Rails and Posts: Galvanized Tube, 12 gauge, 1-1/4 inch diameter.
   5. Counterweight Levers: Galvanized Tube, 12 gauge, 1-1/4 inch diameter.
   6. Mounting Bases: Steel bases are galvanized and are supplied with a rubber pad on underside of the component.
   7. Counterweights: Molded recycled PVC with one fixing collar per counterbalance.
   8. Fasteners: Stainless steel or galvanized.

F. Provide slip-on, non-welded mechanical fittings to join lengths, seal open ends including, but not limited to, elbows, crossovers, T-shapes, and splice connectors.

G. Posts and Rails: Galvanized steel pipe and tube.

H. Finish: Manufacturer's standard, polyester, factory-applied finish.
   1. Color: As selected by Architect from manufacturer's full line.

2.6 MATERIALS - ALUMINUM

A. Aluminum Pipe: Schedule 40; ASTM B429/B429M, ASTM B241/B241M, or ASTM B483/B483M.

B. Aluminum Tube: Minimum wall thickness of 0.127 inch; ASTM B429/B429M, ASTM B241/B241M, or ASTM B483/B483M.

C. Aluminum Non-Welded Mechanical Fittings: Slip-on cast aluminum, for Schedule 40 pipe, with flush set screws for tightening by standard hex wrench, no bolts or screw fasteners.

D. Aluminum Welded Fittings: No exposed fasteners; cast aluminum.

E. Aluminum Straight Splice Connectors: Concealed spigot; cast aluminum.

F. Welding Materials: AWS D1.2/D1.2M; type required for materials being welded.

2.7 MATERIALS - STEEL

A. Structural Steel Sections: ASTM A36/A36M.

B. Steel Plates, Shapes, and Bars: ASTM A6/A6M or ASTM A283/A283M.

C. Steel Pipe: ASTM A53/A53M Grade B Schedule 40.

D. Steel Tubing: ASTM A500/A500M or ASTM A501/A501M structural tubing, round and shapes as indicated.

E. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

F. Steel Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, and galvanized in accordance with ASTM A153/A153M where connecting galvanized hardware components.

G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

H. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.8 MATERIALS - STAINLESS STEEL

A. Stainless Steel, General: ASTM A666, Type 304.

B. Stainless Steel Tubing: ASTM A554, Type 304, 16 gauge, 0.0625-inch minimum metal thickness, 1-1/2-inch diameter.

C. Stainless Steel Bars, Shapes and Moldings: ASTM A276/A276M, Type 304.

D. Welding Materials: AWS D1.6/D1.6M; type required for materials being welded.

2.9 FABRICATION

A. Fabricate work true to dimension, square, plumb, level, and free from distortion or defects detrimental to appearance and performance.

B. Grind off surplus welding material and ensure exposed internal corners have smooth lines.

C. Fabricate system components of the same material unless otherwise indicated.

D. Fabricate anchoring devices as recommended by the manufacturer to provide adequate support for intended use.

E. Fabricate joints in a manner to discourage water accumulation. Provide weep holes to drain all water that could accumulate in the exposed joints.

2.10 FINISHES

A. Galvanizing: Hot-dip galvanize to minimum requirements of ASTM A123/A123M.
   1. Touch up abraded areas after fabrication using specified touch-up primer for galvanized surfaces.

B. Painting: Refer to Section 09 90 00 - Painting and Coating.

C. Stainless Steel: #4 brushed finish, unless noted otherwise.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine area for compliance with requirements for installation tolerances and other conditions related to this work.

B. Confirm that the ladder structure to which the ladder safety system is installed can withstand the loads applied by the system in the event of a fall.

3.2 PREPARATION

A. Coordinate location of fall protection equipment indicated to be attached to structural substrate or surface of roofing system and provide anchoring devices with templates, diagrams, and installation instructions.

3.3 INSTALLATION

A. Install anchorage and fasteners in accordance with shop drawings and manufacturer's recommendations to obtain allowable working loads published in product literature and in accordance with this specification.

B. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous coating or by other permanent separation as recommended by fall protection system manufacturer.

C. Deform threads of tail end of anchor studs after nuts have been tightened to prevent accidental removal or vandalism.

D. Do not load or stress anchors until all materials and fasteners are properly installed and ready for service.

E. Seal roof penetrations at anchors with pre-molded pipe flashing, membrane flashing, or sealant acceptable to roof manufacturer.

F. Install all roof safety anchors a minimum of 6 feet from the roof edge.

3.4 FIELD QUALITY CONTROL

A. Refer to Section 01 40 00 - Quality Requirements for additional requirements.

B. Test anchorage systems using only chemical adhesive fasteners on-site using load cell test apparatus in accordance with manufacturer's recommendations.

C. Load test anchors under the direct supervision of a licensed engineer in accordance with ACI 318, AISC 360, ASCE 7, ICC (IBC), 29 CFR 1910.27, and 29 CFR 1910.66 requirements.

D. Inspect each anchor for conformance to manufacturer requirements, building envelope, looseness, and signs of permanent deflection during load testing.

3.5 ADJUSTING

A. Adjust fall protection components to function smoothly and safely.

3.6 CLEANING

A. Refer to Section 01 77 00 - Closeout Procedures and Checklist for additional requirements.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing in accordance with ASTM A780/A780M.

C. Clean exposed surfaces in accordance with fall protection system manufacturer's written instructions.

3.7 CLOSEOUT ACTIVITIES

A. Refer to Section 01 77 00 - Closeout Procedures and Checklist for closeout submittals.

B. Refer to Section 01 79 00 - Demonstration and Training for additional requirements.

3.8 MAINTENANCE

A. Refer to Section 01 77 00 - Closeout Procedures and Checklist for additional requirements relating to maintenance service.

B. 29 CFR 1910 and ANSI/IWCA I-14 require that anchors first be certified and subsequently inspected on an annual basis. Coordinate with manufacturer and local inspectors as required to maintain compliance.

C. Provide a separate maintenance contract for specified maintenance service.

END OF SECTION 11 81 29

SECTION 12 36 00 - COUNTERTOPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Countertops for architectural cabinet work.
   2. Countertops for manufactured casework.
   3. Wall-hung counters and vanity tops.
   4. Countertop supports.

1.3 PRICE AND PAYMENT PROCEDURES

A. Refer to Section 01 21 00 - Allowances, for cash allowances affecting this section.

B. Refer to Section 01 23 00 - Alternates, for product alternates affecting this section.

1.4 REFERENCE STANDARDS

A. ANSI A208.1 - American National Standard for Particleboard; 2022.

B. ANSI A208.2 - Medium Density Fiberboard (MDF) for Interior Applications; 2016.

C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

D. ASTM B211/B211M - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire; 2019.

E. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2022.

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

G. AWI (QCP) - Quality Certification Program; Current Edition.

H. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).

I. AWMAC (GIS) - Guarantee and Inspection Services Program; Current Edition.

J. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.

K. IAPMO Z124 - Plastic Plumbing Fixtures; 2022.

L. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.

M. ISFA 3-01 - Classification and Standards for Quartz Surfacing Material; 2013.

N. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

O. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2024.

P. NSF 51 - Food Equipment Materials; 2019.

Q. NSI (DSDM) - Dimensional Stone Design Manual, Version VIII; 2016.

R. PS 1 - Structural Plywood; 2009 (Revised 2019).

S. SEFA 2 - Installations; 2010.

T. SEFA 3 - Laboratory Work Surfaces; 2010.

U. WI (CCP) - Certified Compliance Program (CCP); Current Edition.

V. WI (CSIP) - Certified Seismic Installation Program (CSIP); Current Edition.

W. WI (MCP) - Monitored Compliance Program (MCP); Current Edition.

1.5 PERFORMANCE REQUIREMENTS

A. Countertops and Vanities: Provide countertop and vanity framing capable of withstanding the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections, or of exhibiting excessive deflections in any of the components making up the countertops and vanities:
   1. All deadloads.
   2. 500 pound live load placed on the countertop and vanity.
   3. Deflection at Midspan: L/1000 times span or 1/8 inch whichever is less.

1.6 SUBMITTALS

A. Refer to Section 01 33 00 - Submittal Procedures for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Specimen warranty.

C. Shop Drawings: Complete details of materials and installation; combine with shop drawings of cabinets and casework specified in other sections.

D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, minimum size 6 inches square, representing actual product, color, and patterns.

F. Test Reports: Chemical resistance testing, showing compliance with specified requirements.

G. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

H. Installer's qualification statement.

I. Installation Instructions: Manufacturer's installation instructions and recommendations.

J. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.

B. Quality Certification:
   1. Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section: www.awiqcp.org/#sle.
   2. Comply with AWMAC (GIS) woodwork association quality certification service/program in accordance with requirements for work specified in this section.
   3. Comply with WI (CCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section: www.woodworkinstitute.com/#sle.
   4. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
   5. Provide designated labels on shop drawings as required by certification program.
   6. Provide designated labels on installed products as required by certification program.
   7. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.9 FIELD CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.10 WARRANTY

A. Warranty the work specified herein for five (5) years against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials and workmanship.

B. Defects shall include but not be limited to the following:
   1. Rough or difficult operation, or loose or missing parts.
   2. Delamination of surfaces.
   3. Noticeable deterioration of finish.
   4. Warped or misaligned surfaces or telegraphing of subsurface imperfections.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers listed whose products meet or exceed the specifications are approved for use in the Work. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered.

B. Substitutions: Refer to section 01 25 00 - Substitution Procedures.

2.2 COUNTERTOPS

A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

B. Plastic Laminate Countertops: High-pressure decorative laminate (HPDL) sheet bonded to substrate.
   1. Laminate Sheet: NEMA LD 3, Grade HGS, 0.048 inch nominal thickness.
      a. Manufacturers:
         1) Formica Corporation: www.formica.com/#sle.
         2) Lamin-Art, Inc: www.laminart.com/#sle.
         3) Wilsonart: www.wilsonart.com/#sle.
      b. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
      c. NSF approved for food contact.
      d. Wear Resistance: In addition to specified grade, comply with NEMA LD 3 High Wear Grade requirements for wear resistance.
      e. Laminate Core Color: Same as decorative surface.
      f. Finish: Matte or suede, gloss rating of 5 to 20.
   2. Back and End Splashes: Same material, same construction.
   3. Fabricate in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 11 - Countertops, Custom Grade.
   4. Fabricate in accordance with manufacturer's standard requirements.

C. Compact Laminate Type Countertops: Self-supporting high-pressure decorative laminate (HPDL) panel with decorative surface over structural members.
   1. Panels: Phenolic resin impregnated Kraft paper core with melamine impregnated decorative surface papers; NEMA LD 3 Grade CGS.
      a. Manufacturers:
         1) Arborite; Compact Grade Laminate: www.arborite.com/#sle.

2) Formica Corporation: www.formica.com/#sle.
3) Wilsonart: www.wilsonart.com/#sle.

b. Panel Thickness:1 inch.
c. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
d. NSF approved for food contact.
e. Wear Resistance: In addition to specified grade, comply with NEMA LD 3 High Wear Grade requirements for wear resistance.
f. Core Color: Brown.
g. Finish: Matte or suede, gloss rating of 5 to 20.

2. Exposed Edge Treatment: Square natural cut sanded and polished to semi-gloss sheen.
3. Back and End Splashes: Same material, same construction; minimum 4 inches high.
4. Fabricate in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 11 - Countertops, Custom Grade.
5. Fabricate in accordance with manufacturer's standard requirements.

D. Tile Countertops: Tile bonded to substrate after installation of substrate on cabinet.
1. Tile: Refer to the following:
a. Section 09 30 00 - Tiling.
2. Adhesive and Grout: Materials and installation as specified in Tiling Section(s) listed above.
3. Substrate: Plywood.
4. Exposed Edge Treatment: Square profile; substrate built up to minimum 1-1/4 inch thick, covered with matching tile.
5. Exposed Edge Treatment: Hardwood nosing as indicated on Drawings.
6. Back and End Splashes: Same material, coved joint, bullnose top edge.

E. Wood Countertops: One-piece, glued-laminated under pressure.
1. Thickness: 1-1/4 inch, minimum.
2. Species: Maple; clear grade.
3. Exposed Edges: Rounded to approximately 3/8 inch radius.
4. Back and End Splashes: Same material, same construction; 3/4 inch thick, square edges.
5. Finish: Sanded smooth; two coat boiled linseed oil rubbed in with 48 hours between coats.
6. Associated Reagent Shelves and Racks: Same material and construction.
7. Fabricate in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 11 - Countertops, Custom Grade.
8. Fabricate in accordance with manufacturer's standard requirements.

F. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
1. Flat Sheet Thickness: 1/2 inch, minimum.
2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
a. Manufacturers:
1) American Bath Group: www.americanbathgroup.com/#sle.
2) Avonite Surfaces: www.avonitesurfaces.com/#sle.
3) Dupont: www.corian.com/#sle.
4) Formica Corporation: www.formica.com/#sle.
5) LG Hausys America, Inc; HI-MACS 12mm: www.lghausysusa.com/#sle.
6) Meganite, Inc: www.meganite.com/#sle.
7) Relang International, LLC; DURASEIN: www.duraseinusa.com/#sle.
8) Wilsonart: www.wilsonart.com/#sle.

b. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
c. NSF approved for food contact.
d. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
e. Color and Pattern: As selected by Architect from manufacturer's full line.

3. Other Components Thickness: 1/2 inch, minimum.
4. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.
5. Skirts: As indicated on Drawings.
6. Fabricate in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 11 - Countertops, Premium Grade.
7. Fabricate in accordance with manufacturer's standard requirements.

G. Solid Plastic Wall-Hung Vanity Tops: Factory fabricated top, splashes, skirts, end supports, and center supports made of solid molded high density polyethylene (HDPE) sheets, tested in accordance with NFPA 286.

1. Manufacturers:
   a. Scranton Products; Vanities: www.scrantonproducts.com/#sle.
2. Sheet Thickness: 1 inch with edges radiused to 1/4 inch.
3. Vanity Size: 24 inches deep by length indicated on Drawings.
4. Shoes: 3 inches, one piece molded HDPE.
5. Attachment Brackets: 16 inches long, heavy duty extruded aluminum.
   a. Color: Black.
6. Surface Burning Characteristics: Flame spread index of 75, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
7. NSF approved for food contact.
8. Color and Texture: As selected by Architect from manufacturer's full line.

H. Solid Surfacing Wall Panels: Solid surfacing sheet or plastic resin casting over continuous substrate.

1. Flat Sheet Thickness: 1/4 inch, minimum.
2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
   a. Manufacturers:
      1) American Bath Group: www.americanbathgroup.com/#sle.
      2) Meganite, Inc: www.meganite.com/#sle.
3. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
4. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
5. Fabricate in accordance with manufacturer's standard requirements.

2.3 ACCESSORIES

A. Countertop and Vanity Supports:

1. Custom Fabricated Countertop and Vanity Framing:
   a. Material: Steel
   b. Fabrication: Fabricate countertop and vanity framing, using steel shapes and plates, and cold finished mild steel bars at exposed conditions, for support framing and plywood, to the thicknesses, sizes and shapes shown, and as required to produce work of adequate strength and durability, without objectionable deflections. Use proven details of fabrication, as required, to achieve proper assembly and alignment of the various components of the work.
   c. Finish: Powder Coat.
      1) Color: Black.
2. Pre-Fabricated Countertop and Vanity Supports:

a. Material: Aluminum.
b. Finish: Clear Anodized.
c. Basis of Design: Rakks manufactured by Rangine Corporation.

3. Pre-Fabricated Countertop Support:
   a. Basis of Design: Front Mounting Plus manufactured by Centerline Brackets.
   b. Material: 3/8 by 2-1/2 inch steel.
   c. Bracket Depth and Height: As recommended by manufacturer.
   d. Finish: Powder Coat.
      1) Color: Black.

2.4 MATERIALS

A. Extruded Aluminum: ASTM B211/B211M, 6463 alloy, T5 temper.

B. Wood-Based Components:
   1. Wood fabricated from old growth timber is not permitted.
   2. Provide sustainably harvested wood, certified or labeled; refer to Section 01 60 00 - Product Requirements.
   3. Provide wood harvested within a 500 mile radius of the project site.
   4. Wood fabricated from timber recovered from riverbeds or otherwise abandoned is permitted, unless otherwise noted, provided it is clean and free of contamination; identify source; provide lumber re-graded by an inspection service accredited by the American Lumber Standard Committee, Inc.

C. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.

D. Particleboard for Supporting Substrate: ANSI A208.1 Grade 2-M-2, 45 pcf minimum density; minimum 3/4 inch thick; join lengths using metal splines.

E. Medium Density Fiberboard for Supporting Substrate: ANSI A208.2.

F. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.

G. Cove Molding for Top of Splashes: Rubber with semi-gloss finish and T-spline to fit between splash and wall; 1/2 inch by 1/2 inch.
   1. Color: As indicated on drawings.
   2. Color: As selected by Architect from manufacturer's full line.

H. Joint Sealant: Mildew-resistant silicone sealant, white.

I. Polyester Protective Film: Scratch-, heat-, and acid-resistant optically clear removable polyester film for bonding to stone counters.
   1. Thickness: 4 mil, 0.004 inch, minimum.
   2. Finish: Gloss.
   3. Construction: Multi-ply laminate.
   4. Adhesive Type: Pressure sensitive acrylic.
   5. Surface Burning Characteristics: Flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84 (Class A).
   6. NSF approved for food contact per NSF 51.
   7. Products:
      a. Stoneguard USA: www.stoneguardusa.com/#sle.
      b. Surface Shields, Inc: www.surfaceshields.com/#sle.
      c. TuffSkin Surface Protection LLC; TuffSkin: www.tuffskin.com/#sle.
      d. Substitutions: See Section 01 60 00 - Product Requirements.

J. Sealer: Stain and acid protection for natural stone counters.
   1. NSF approved for food contact per NSF 51.
   2. Products:
      a. Custom Building Products: www.custombuildingproducts.com/#sle.

b. Rockstar Sealing, a division of TuffSkin Surface Protection LLC; Natural Finish Stone Sealer: www.rockstarsealing.com/#sle.
c. STONETECH, a division of LATICRETE International, Inc: www.laticrete.com/#sle.
d. Substitutions: See Section 01 60 00 - Product Requirements.

2.5 FABRICATION

A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
1. Join lengths of tops using best method recommended by manufacturer.
2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
a. Rout a 1/8 inch drip groove at underside of exposed overlapping edges, set back 1/2 inch from face of edge.
3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.

B. Provide back/end splash where indicated on Drawings.
1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
2. Height: 4 inches, unless otherwise indicated.

C. Solid Surfacing: Fabricate tops and wall panels up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.
1. Integral sinks: Shop-mount securely to countertop with adhesives, using flush configuration, as per manufacturer's instructions, and as detailed on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install vanities in accordance with manufacturer’s instructions and approved shop drawings

B. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.

C. Attach plastic laminate countertops using screws with minimum penetration into substrate board of 5/8 inch.

D. Attach wood countertops using screws with minimum penetration into substrate board of 5/8 inch.

E. Tile installation, refer to Section 09 30 00.

F. Seal joint between back/end splashes and vertical surfaces.
1. Where indicated use rubber cove molding.
2. Where applied cove molding is not indicated use specified sealant.

3.4 TOLERANCES

A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.

B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.

C. Field Joints: 1/8 inch wide, maximum.

3.5 CLEANING

A. Clean countertops surfaces thoroughly.

3.6 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION 12 36 00

SECTION 12 48 13 - ENTRANCE FLOOR MATS AND FRAMES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Extruded aluminum entrance floor grilles.

B. Stainless steel entrance floor gratings.

C. Carpet mat.

1.2 SUBMITTALS

A. Refer to Section 01 33 00 - Submittal Procedures for submittal procedures.

B. Product Data: Provide data indicating properties of walk-off surface, component dimensions and recessed frame characteristics.

C. Shop Drawings: Indicate dimensions and details for recessed frame.
   1. For recessed frames located within a dimensionally restricted area, show dimensions of space within which the frame will be installed.

D. Samples: Submit two samples, 6 by 6 inch in size illustrating pattern, color, finish, and edging.

E. Maintenance Data: Include cleaning instructions, and stain removal procedures.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with specification requirements, products by the listed manufacturers or fabricators may be submitted for use in the Work.
   1. Entrance Floor Grilles and Gratings:
      a. Activar Construction Products Group - JL Industries; Entrance Grilles: www.activarcpg.com.
      b. Babcock-Davis: www.babcockdavis.com.
      c. Balco, Inc: www.balcousa.com.
      d. Construction Specialties, Inc; Entrance Grids: www.c-sgroup.com.
      e. Nystrom, Inc; envIRONtread II Rigid Grille: www.nystrom.com.
      f. Pawling Corporation: www.pawling.com.
      g. Reese Enterprises, Inc: www.reeseusa.com.
   2. Entrance Floor Mats:
      a. Activar Construction Products Group - JL Industries: www.activarcpg.com.
      b. American Floor Products Company, Inc: www.afco-usa.com.
      c. Babcock-Davis: www.babcockdavis.com.
      d. Balco, Inc: www.balcousa.com.
      e. Construction Specialties, Inc; Entrance Mats: www.c-sgroup.com.
      f. Nystrom, Inc; MATrac: www.nystrom.com.
      g. R.C. Musson Rubber Co: www.mussonrubber.com.
      h. Pawling Corporation: www.pawling.com.
      i. Reese Enterprises, Inc: www.reeseusa.com.

B. Substitutions: Refer to section 01 25 00 - Substitution Procedures.
   1. Manufacturers and fabricators not listed must have a minimum of 5 years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered. Submit as a substitution.

2.2 ENTRANCE FLOOR GRILLES AND GRATINGS

A. Entrance Floor Grilles: Recessed extruded aluminum grille assembly with nominal 1 inch wide tread strips running perpendicular to traffic flow, slots between treads, and perimeter frame forming sides of recess; grille hinged for access to recess.

1. Recess Depth: 3/4 inches.
2. Tread Surfaces: Alternating serrated anodized aluminum and nylon carpet.
3. Tread Surfaces: Serrated anodized aluminum.
4. Colors: As indicated on drawings.
5. Colors: To be selected by Architect from manufacturer's standard selection.
6. Length in Direction of Traffic Flow: 72 inches.
7. Width Perpendicular to Traffic Flow: Full width of entrance door opening.
8. Frame: Anodized aluminum for embedding in concrete; minimal exposed trim; stud or hook concrete anchors.
9. Pan: Anodized aluminum bottom pan with drain, sealed to frame.

B. Entrance Floor Gratings: Recessed stainless steel bar grating with longitudinal bars running perpendicular to traffic flow and perimeter frame forming sides of recess; grating hinged for access to recess.
1. Grating: Longitudinal bars 0.09 inch, nominal, in width, spaced at less than twice the bar width apart; cross bars set below for pronounced linear appearance.
2. Carpet Strips: Nylon carpet tread strips, nominal 1 inch wide, set into grating at 4 inches, nominal, on center in direction of traffic flow.
3. Grating Depth: 3/8 inches, nominal.
4. Recess Depth Below Bottom of Grating: 1 inches.
5. Length in Direction of Traffic Flow: 72 inches.
6. Width Perpendicular to Traffic Flow: Full width of entrance door opening.
7. Frame: Anodized aluminum for embedding in concrete; minimal exposed trim; stud or hook concrete anchors.
8. Pan: Anodized aluminum bottom pan with drain, sealed to frame.

C. Mounting: Top of non-resilient members level with adjacent floor.

D. Structural Capacity: Capable of supporting a rolling load of 500 pounds without permanent deformation or noticeable deflection.

E. Vibration Resistant Fabrication: All members welded, riveted, or bolted; no snap or friction connections.

2.3 ENTRANCE FLOOR MATS

A. Carpet Mat:
1. Basis of Design:
a. DesignStep manufactured by Construction Specialties, Inc.
2. Description: Polypropylene fiber carpet with nitrile backing and frame.
3. Carpet:
a. Material: 100% UV resistant polypropylene.
b. Face Weight: 44 oz.
c. Thickness: 1/2 inch.
d. Pattern: Duration.
e. Color: 900 Castle Gray.

2.4 FABRICATION

A. Fabricate mats in single unit sizes; fabricate multiple mats where indicated on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that floor opening for mats are ready to receive work.

3.2 PREPARATION

A. Mats: Verify size of floor recess before fabricating mats.

B. Vacuum clean floor recess.

3.3 INSTALLATION

A. Install walk-off surface in floor recess flush with finish floor after cleaning of finish flooring.

END OF SECTION 12 48 13

SECTION 21 00 00 - FIRE PROTECTION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. The Basic Materials and Methods, Section 22 02 00, are included as a part of this Section as though written in full in this document.

1.2 SCOPE

A. The scope of the work shall include the furnishing and complete installation of the fire protection piping, valves, hose connections, and equipment covered by this Section, with all appurtenances, ready for owner's use.

B. Ensure to color code and paint all control valves and provide a corresponding legend to identify each system served.

1.3 RELATED WORK

A. Section 21 05 29 - Hangers and Supports for Fire Suppression Piping and Equipment

B. Section 21 13 13 - Wet Pipe Sprinkler System

1.4 REFERENCES

A. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

B. ASTM A135/A135M - Standard Specification for Electric-Resistance-Welded Steel Pipe

C. ASTM A795/A795M - Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use

D. FM Global Fire Protection Standards

E. NFPA 13 - Standard for the Installation of Sprinkler Systems

F. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems

G. UL - Underwriters Laboratories

1.5 QUALITY ASSURANCE

A. Manufacturer: For each product specified, provide components by the same manufacturer throughout.

B. Valves: Manufacturer's name, size, and pressure rating shall be cast or marked on valve body or handle.

C. Piping shall be labeled along its entire length indicating size, class, material specification, manufacturer's name and country of origin.

D. Domestic Manufacture: All valves, pipe, fittings, hose connections, and equipment shall be by a domestic manufacturer.

1.6 SUBMITTALS

A. Submit shop drawings in accordance with Section 22 02 00 and as described below.

B. Submit shop drawings of entire water-based building fire protection system with all standpipe, hose valve, and hose connection locations, including the accompanying hydraulic calculations to the Architect/Engineer for review. **A current and fully documented fire hydrant flow test must be included.**

C. Service Utility Diagram: Furnish Architect with an accurately marked print showing location of underground pipes and valves as installed upon completion of underground work.

D. Submit product data to include pipe materials, pipe fittings, valves, hose connections, waterflow and alarm devices, and other appurtenances. Provide manufacturer's catalog information, product certifications, and **country of origin**. Indicate valve data and ratings.

1.7 REGULATORY REQUIREMENTS

A. Work in accordance with:
1. NFPA 13 - Standard for the Installation of Sprinkler Systems.
2. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems
3. NFPA 24 - Standard for the Installation of Private Fire Service Mains and Their Appurtenances
4. NFPA 25 - Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems
5. Local codes that have jurisdiction.

B. Products in accordance with:
1. UL (Underwriters Laboratories) listed.
2. FM (Factory Mutual) approved.
3. Requirements of the local Authority Having Jurisdiction (AHJ).

1.8 CERTIFICATE OF TESTING

A. Furnish Owner with test certificate certifying the system approved by:
1. Fire Marshal.
2. Insurance Services Officials.

PART 2 - PRODUCTS

2.1 GENERAL

A. Work included:
1. The Drawings provide a preliminary layout with locations of hose connections and fire department connection(s). These are a guide for the subsequent preparation of the Licensed Fire Sprinkler Contractor's detailed working drawings.

2. Coordinate work and installation with electrical and fire alarm contractors accordingly to interface system with the building fire and smoke alarm systems.

B. Requirements:
   1. Materials and installation to meet or exceed the requirements of NFPA 13 and 14, (prevailing editions) and the local authority having jurisdiction (AHJ).
   2. All components of the system shall be UL listed for the intended service.
   3. Provide components with minimum pressure ratings as suited for system working pressure(s).
   4. All hose connections shall be provided with approved threads, caps, and chains.
   5. Supervised valves shall have tamper switches. Supervisory switches shall be double pole, single throw, with cast aluminum housing and tamper-proof cover.

2.2 FIRE HOSE VALVES, CONNECTIONS, AND EQUIPMENT

A. General requirements:
   1. All hose valves shall be listed.
   2. All hose connections shall be provided complete with connections, caps and chains conforming to local Fire Department requirements.
   3. **Unless prohibited by the local Authority Having Jurisdiction (AHJ)**, all standpipe hose connections shall be enclosed in flush mounted wall cabinets and located in main circulation paths adjacent to classrooms.

B. Acceptable Manufacturers:
   1. Potter-Roemer
   2. Dixon
   3. Elkhart Brass
   4. Croker

PART 3 - EXECUTION

3.1 DESIGN

A. The Contractor shall conform to the requirements of NFPA 14 for standpipe and hose system design and installation. It shall be the Contractor's responsibility to determine if any deficiency or deviations exist, such as an inadequate water supply, or any other item which would materially affect the acceptability of the system.

3.2 INSTALLATION

A. Install all items in accordance with applicable codes.

B. Piping shall be protected accordingly where subject to mechanical damage and/or fire damage.

C. Do not install risers or mains in MDF/IDF/Data closets or electrical rooms. Where sprinkler protection is provided, only the associated branch lines and sprinkler heads shall be allowed in such spaces.

D. Piping (mains and standpipes) shall be protected accordingly from freezing temperature with the use of supervised and listed heat tracing with insulation and jacketing.

E. In all locations subject to corrosive conditions, ensure to provide a suitable epoxy (spray) coating to all exposed surfaces of pipe and fittings. All job-applied protective coatings shall be provided as approved and only after verification that the proper piping has been installed, per the markings along the length of the pipe.

F. Piping in finished spaces shall be routed concealed. This shall not include areas such as mechanical spaces, parking garages, and stairways. Exact routing of piping shall be approved by Architect or relocated as required at no additional cost to Owner.

G. All standpipes shall be provided with a means of draining and shall be arranged to discharge water at an approved location.

H. Identify all locations requiring coordination with the electrical and fire alarm contractors accordingly to ensure connectivity with the building fire and smoke alarm systems. This shall include, but is not necessarily limited to, the following: water flow switches, alarm bells, and tamper/supervisory switches at control valves.

I. At building expansion joints provide approved system expansion joint fittings/assemblies accordingly and per manfucturer's recommendations and NFPA 13 requirements. Victaulic Style 155 carbon steel expansion joint for sizes up to and including 12" pipe.

3.3 PAINTING AND PIPE IDENTIFICATION

A. Painting of fire protection piping and appurtenances shall be provided as follows:
   1. Surfaces to be painted shall be cleaned as necessary to ensure they are free from dirt and oils.
   2. Unless directed otherwise by Architect, heat and water resistant, air-cured, high performance one-part epoxy paint shall be provided. Coating shall be high-gloss, lead-free, suited for indoor and outdoor use, and USDA approved. Armor-Poxy or similar.
   3. Fire sprinkler risers and associated alarm valves and related piping exposed in occupied spaces shall be painted red.
   4. Fire protection and sprinkler piping exposed in occupied spaces shall be painted as directed by Architect.
   5. Fire protection and sprinkler piping exposed in unoccupied accessory areas such as stairways shall be painted red unless directed otherwise by Architect.

B. Identification of fire protection piping shall be provided as follows:
   1. All interior visible piping located in accessible spaces shall be provided with pipe markers. Accessible spaces shall include, but not necessarily be limited to, the following: above accessible ceilings, inside equipment rooms and utility spaces, in attic spaces, in crawl spaces, and in chase spaces, etc. viewable via access panels.
   2. All exterior visible piping shall be provided with pipe markers.
   3. Peel-off, self-adhesive, sticker type labels shall not be acceptable.
   4. Pipe markers shall be manufactured with rigid vinyl PVC, printed with UV resistant ink, abrasion and chemical resistant, suited for indoor or outdoor use and for a service temperature of -40 degrees F to 160 degrees F.
      a. For pipes up to 6” provide cylindrically pre-coiled markers that snap into place without the need for tape or adhesives.

b. For pipes 6” and larger provide flat snap-around markers installed using manufacturer’s heavy-duty nylon ties or stainless steel strapping.
c. Markers shall indicate the pipe service, include flow directional arrows, and meet ANSI/ASME A13.1-2015.

5. Acceptable manufacturers:
   a. Seton Setmark Pipe Markers
   b. Brimar Industries Pipemarker System 1 Pipe Markers
   c. Brady Corporation
6. Markers shall be provided after final insulating, painting, jacketing, etc. of piping and per manufacturer’s installation instructions. Strapping (applies to large diameter markers only) shall be snug but shall not compromise any insulation. All such strapping shall also be cleanly trimmed of excess material.
7. Markers shall be provided in accordance with ANSI/ASME A13.1-2015 requirements. **Specific items indicated below are not intended as a substitute for this complete standard**. Markers shall be provided:
   a. On both sides of each floor or wall penetration.
   b. On each side of each tee.
   c. On each side of each valve and/or valve group.
   d. On each side of each piece of equipment.
   e. On straight pipe runs at equally spaced intervals not to exceed 50 feet.
   f. In congested areas, on each pipe at the point it enters and exits the area.
   g. At the point of connection to each piece of equipment and automatic control valve.
   h. Where they are readily visible to personnel from the point of normal approach.
   i. With letter height and length of color field according to the size of the pipe served.
8. Color scheme of markers shall be as indicated below and otherwise in accordance with ANSI/ASME color recommendations. Legend color indicates color of legend text and flow directional arrow:

SYSTEM	LABEL COLOR	LEGEND	LEGEND COLOR
Fire Protection	Red	Fire Protection	White
	Red	Fire Sprinkler	White

3.4 REPLACEMENT

A. Upon receipt of written notice of failure of any part of the guaranteed equipment during the guaranteed period, the Contractor will replace the affected part or parts promptly at no additional cost.

3.5 TESTING

A. Upon completion of the installation, test the system and obtain approval of the local fire insurance rating organization having jurisdiction.

3.6 TRAINING

A. Owner’s people shall be fully briefed in the normal start-up of the system, operation, normal and emergency shutdown, and maintenance of the system.

B. Routine maintenance, yearly maintenance, winterization, and spring start-up shall be fully discussed and documented.

C. Names of those instructed and dates, as well as a list of information handed over to the owner, shall be included in the final report.

END OF SECTION 21 00 00

SECTION 21 05 29 - HANGERS AND SUPPORTS FOR FIRE SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Pipe hangers, supports, and associated appurtenances.

B. Sleeves and seals.

1.2 RELATED WORK

A. Section 21 00 00 - Fire Protection

B. Section 21 13 13 - Wet Pipe Sprinkler System

1.3 REFERENCES

A. ASME B31.1 - Power Piping.

B. NFPA 13 - Standard for the Installation of Sprinkler Systems.

C. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems.

1.4 QUALITY ASSURANCE

A. Supports for Sprinkler Piping: In conformance with NFPA 13.

B. Supports for Standpipes: In conformance with NFPA 14.

1.5 SUBMITTALS

A. Submit shop drawings and product data under provisions of Division One.

B. Indicate hanger and support framing and attachment methods.

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

A. Hangers for Pipe Sizes up through 2 Inch: Carbon steel, adjustable swivel ring type with rounded edge design, UL listed and FM approved. Anvil International Figure 69.

B. Hangers for Pipe Sizes 2-1/2 Inch and larger:
   1. Carbon steel, adjustable clevis type, UL listed and FM approved. Anvil International Figure 260.
   2. Carbon steel, adjustable swivel ring type, UL listed and FM approved. Anvil International Figure 69.
   3. Carbon steel, UL listed hangers with beveled edge design and/or plastic coating for abrasion protection of and intended for use with CPVC piping (only where such pipe material is specified). Anvil International.

C. Building structure attachments for hangers: Ductile iron, universal C-type clamps, UL listed and FM approved. Anvil International Figure 92, 93, 94.

D. **Under no circumstances will straps be allowed for hanging or supporting of sprinkler piping.**

E. Vertical Piping Supports: Carbon steel riser clamp. Anvil International Figure 40.

F. Floor Supports for pipe headers and similar horizontal runs of pipe: Steel pipe stand assembly.
   1. Cylindrical pipe stanchion assembly complete with malleable iron flange or welded steel flange base plate secured to the floor by an approved method with listed anchors.
   2. Each base plate shall be attached to the floor with a minimum of four (4) anchors no smaller than 1/2" diameter, per NFPA 13.
   3. Provide pipe saddle support with steel U-bolt yoke and nuts to attach piping to each stand.
   4. Anvil International Figure 63, Type P with Figure 259 saddle support.

G. Equivalent UL listed, FM approved hanger and support products by Eaton B-Line shall also be acceptable.

H. For installation of protective shields refer to Article 3.3.

2.2 HANGER RODS

A. Galvanized or cadmium plated carbon steel hanger rods: Threaded both ends, threaded one end, or continuous threaded. Provide rod couplings in matching finish.

2.3 INSERTS/FASTENERS

A. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

B. Fasteners: For wood construction and for metal purlin and metal deck applications only, the use of appropriate self-drilling fasteners (UL listed, FM approved, manufactured in USA) provided in accordance with manufacturer’s recommendations shall be acceptable. ITW Buildex “Sammys” products or pre-approved equal.

2.4 SLEEVES

A. Sleeves for Pipes through Non-fire Rated Floors: Form with 18 gage galvanized steel, tack welded to form a uniform sleeve.

B. Sleeves for Pipes through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Form with steel pipe, schedule 40.

C. Sleeves for Pipes through Fire Rated and Fire Resistive Floors and Walls, and Fireproofing: Prefabricated fire rated steel sleeves including seals, UL listed.

D. Fire Stopping Insulation: Glass fiber type, non-combustible, UL listed.

E. Caulk: Paintable 25-year acrylic sealant.

F. Pipe Alignment Guides: Factory fabricated, of cast semi-steel or heavy fabricated steel, consisting of bolted, two-section outer cylinder and base with two-section guiding spider that bolts tightly to pipe. Length of guides shall be as recommended by manufacturer to allow indicated travel.

2.5 FABRICATION

A. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

B. Design hangers without disengagement of supported pipe.

2.6 FINISH

A. Exposed steel hangers, supports, and appurtenances shall be hot-dipped galvanized. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

PART 3 - EXECUTION

3.1 INSERTS

A. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams. Coordinate with structural engineer for placement of inserts.

B. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.

C. Where concrete slabs form finished ceiling, provide inserts to be flush with slab surface.

D. Where inserts are omitted, drill through concrete slab from below and provide thru-bolt with recessed square steel plate and nut recessed into and grouted flush with slab. Verify with structural engineer prior to start of work.

3.2 PIPE HANGERS AND SUPPORTS

A. Support horizontal piping with maximum distance between hangers and minimum hanger rod diameters as follows:

Pipe Size	Max. Hanger Spacing	Min. Rod Diameter
(Steel Pipe)		
1 to 1-1/4 inch	10'-0"	3/8"
1-1/2 to 3 inch	12'-0"	3/8"
4 to 6 inch	12'-0"	1/2"
8 to 10 inch	12'-0"	5/8"
12 to 14 inch	12'-0"	3/4"
(CPVC Pipe, only where specified)		
3/4 to 1 inch	4'-0"	3/8"
1-1/4 to 1-1/2 inch	4'-0"	3/8"
2 to 3 inch	6'-0"	3/8"

B. Where a listed CPVC pipe manufacturer’s maximum hanger spacing is more stringent than the spacing above, it shall be followed.

C. Spacing of hangers for unbroken lengths of CPVC pipe shall be permitted to be increased to a maximum of 5’-6” for 3/4" piping and 6’-0” for 1” through 1-1/2” piping.

D. Ensure to adequately secure sprinkler piping to restrict the movement of piping upon sprinkler operation. Where listed CPVC pipe is specified, supports must be provided as required in accordance with the pipe manufacturer’s recommendations.

E. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.

F. Place a hanger within 12 inches of each horizontal elbow and at the vertical to horizontal transition.

G. Use hangers with 1-1/2 inch minimum vertical adjustment.

H. Ensure that hanger rods are only loaded axially (along the rod). Provide additional hangers or restraints as necessary to minimize non-axial loads

I. Threaded sections of rod shall not be formed or bent, neither prior to nor as a result of installation.

J. Support vertical piping at every floor. Distances between supports for risers shall not exceed 25 feet.

K. In multi-story buildings (in addition to at every floor) riser supports shall be provided at the lowest level, above and below offsets, and at the top of the riser.

L. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

M. Support riser piping independently of connected horizontal piping.

N. Install hangers with a nut at the base and above the hanger; tighten upper nut to hanger after final installation adjustments.

O. Where piping is subject to seismic activity, ensure to provide protection measures in accordance with NFPA 13 requirements.

3.3 INSULATED PIPING

A. Comply with the following installation requirements.

B. Clamps: Attach galvanized clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ASME B31.9.

C. Saddles: Install galvanized protection saddles MSS Type 39 where insulation without vapor barrier is indicated. Fill interior voids with segments of insulation that match adjoining pipe insulation.

D. Shields: Install protective shields MSS Type 40 on cold and chilled water piping that has vapor barrier. Shields shall span an arc of 180 degrees and shall have dimensions in inches not less than the following:

Nominal Pipe Size	Length	Thickness
1/4 through 3-1/2 inch	12 inch	0.048 inch
4 inch	12 inch	0.060 inch

5 through 6 inch	18 inch	0.060 inch
8 through 14 inch	24 inch	0.075 inch
16 through 24 inch	24 inch	0.105 inch

E. Piping 2” and larger provide galvanized sheet metal shields with calcium silicate at hangers/supports.

F. Insert material shall be at least as long as the protective shield.

G. Thermal Hanger Shields: Install where indicated, with insulation of same thickness as piping.

3.4 EQUIPMENT BASES AND SUPPORTS

A. Provide equipment bases of concrete.

B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.

C. Construct support of steel members. Brace and fasten with flanges bolted to structure.

3.5 SEALS

A. Provide flexible watertight sealant where piping penetrates waterproofed walls, floors, and roofs.

B. Where dry sprinklers are connected to wet pipe sprinkler systems protecting areas subject to freezing temperatures (such as, but not necessarily limited to, insulated freezer structures) ensure that the clearance space around the sprinkler barrel is completely sealed in accordance with the manufacturer’s recommendations.

3.6 SLEEVES

A. Set sleeves in position in formwork. Provide reinforcing around sleeves.

B. Extend sleeves through floors minimum one inch above finished floor level. Caulk sleeves full depth with fire rated thermafiber and 3M caulking and provide floor plate.

C. Where piping penetrates a floor, ceiling, or wall, close off space between pipe and adjacent work with UL listed fire stopping insulation and caulk seal air tight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

D. Fire protection sleeves may be flush with floor of stairways.

END OF SECTION 21 05 29

SECTION 21 13 13 - WET PIPE SPRINKLER SYSTEM

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. The Basic Materials and Methods, Section 22 02 00, are included as a part of this Section as though written in full in this document.

C. Refer to Section 21 00 00 for integral requirements.

1.2 SCOPE

A. Scope of the work shall include the furnishing and complete installation of the fire protection piping, valves, sprinkler heads, and equipment covered by this Section, with all appurtenances, ready for owner's use.

B. The scope of work shall include the painting and pipe marking of fire sprinkler system piping as described in Section 21 00 00.

C. The scope of work shall include providing UL listed, FM approved automatic release air vents on sprinkler branch lines for the reduction of trapped air in the sprinkler system. Provide each complete with supervised valve, strainer, union, and drain line to drain in accordance with manufacturer’s recommendations and local requirements.

D. The provision of air vents shall be coordinated with any other systems or treatment for MIC (Microbiologically Influenced Corrosion) that may be specified.

1.3 RELATED WORK

A. Section 21 00 00 - Fire Protection

B. Section 21 05 29 - Hangers and Supports for Fire Suppression Piping and Equipment

1.4 REFERENCES

A. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2024.

B. ASTM A135/A135M - Standard Specification for Electric-Resistance-Welded Steel Pipe; 2021.

C. ASTM A795/A795M - Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use; 2021.

D. ASTM F439 - Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80; 2024.

E. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021, with Errata (2023).

F. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; 2018.

G. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings; 2021.

H. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings; 2023.

I. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast; 2023.

J. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances; 2023.

K. NFPA 13 - Standard for the Installation of Sprinkler Systems; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

L. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems; 2024.

M. NFPA 24 - Standard for the Installation of Private Fire Service Mains and Their Appurtenances; 2025.

N. NFPA 25 - Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems; 2023.

1.5 QUALITY ASSURANCE

A. Manufacturer: For each product specified, provide components by the same manufacturer throughout.

B. Valves: Manufacturer's name, size, and pressure rating shall be cast or marked on valve body or handle.

C. Piping shall be labeled along its entire length indicating size, class, material specification, manufacturer’s name and **country of origin**.

D. Domestic Manufacture: All valves, pipe, fittings, sprinkler heads, and equipment shall be by a domestic manufacturer.

E. Welding Procedures and Performance:
   1. Meet or exceed the requirements of AWS B2.1/B2.1M “Welding and Brazing Qualifications”; as well as any local AHJ requirements.
   2. Maintain and be able to produce complete certified records, including, but not necessarily limited to, the following: Welding Procedure Specifications (WPS’s), Procedure Qualification Records (PQR’s), and welder qualification records.

1.6 SUBMITTALS

A. Submit shop drawings in accordance with Section 22 02 00 and as described below.

B. Submit product data with manufacturer’s catalog information, product certifications, and **country of origin** identified. Indicate valve data and ratings. Product data to be submitted shall include, but not necessarily be limited to, the following:
   1. Pipe material
   2. Pipe fittings and couplings

3. Sprinkler heads and guards
4. Valves, air release vents, and backflow preventers
5. Waterflow, supervisory and alarm devices
6. Fire-stopping sealant and pipe marker products
7. Spare sprinkler head box, signage, and other accessories
8. Include a schedule of wall sleeves to be provided

C. Product data for hangers and and supports *may* be submitted under this section, although these items are specified under Section 21 05 29 – Hangers and Supports for Fire Suppression Piping and Equipment.

D. Submit shop drawings of entire sprinkler system with all head locations and including accompanying hydraulic calculations to the Architect/Engineer for review. **A current and fully documented fire hydrant flow test must be included.**

E. Provide Architect with six complete sets of final approved shop drawings before starting the installation. Include details of the sprinkler system showing sections, light fixtures, ducts, and a plan indicating fire department connections, location of all exposed structures within twenty feet of this structure, and other equipment to be used. Drawings shall bear the stamp of review of the local fire insurance rating organization having jurisdiction.

F. Service Utility Diagram: Furnish Architect with an accurately marked print showing location of underground pipes and valves as installed upon completion of underground work.

G. Where a project is required to comply with FM Global requirements, ensure to submit a set of drawings, hydraulic calculations, and other required documentation to a designated representative of FM Global for review and acceptance prior to the start of any system installation.

1.7 REGULATORY REQUIREMENTS

A. Work in accordance with:
1. NFPA 13
2. NFPA 14
3. NFPA 24
4. NFPA 25
5. Requirements of the local Authority Having Jurisdiction (AHJ).
6. FM Global Datasheet 2-0.

B. Products in accordance with:
1. UL listed.
2. FM (Factory Mutual) approved.
3. Requirements of the local Authority Having Jurisdiction (AHJ).

1.8 CERTIFICATE OF TESTING

A. Furnish the Owner with test certificate certifying the system approved by:
1. Fire Marshal
2. Insurance Services Officials

PART 2 - PRODUCTS

2.1 GENERAL

A. Work included:
   1. Design, coordination, furnishing, and installation of inside and outside piping, valves, sprinkler heads, hangers, supports, and sleeves.
   2. The sprinkler system is an automatic wet pipe type system and shall be designed to provide coverage for the entire building unless specifically indicated otherwise.
      a. The Contract Drawings indicate the general extent and arrangement.
      b. The Contract Drawings identify rooms and spaces, which may aid in the determination of the various occupancy hazard classifications.
      c. Sprinkler heads are not shown.
   3. The Drawings provide a preliminary layout with locations of water service entry/water supply, control valves, riser assembly/zone valves, and fire department connection(s). These are a guide for the subsequent preparation of the Licensed Fire Sprinkler Contractor's detailed working drawings.
   4. Coordinate work and installation with electrical and fire alarm contractors accordingly. Ensure that power is provided at required locations. Ensure that system is interfaced with the building fire and smoke alarm systems. This shall include, but not necessarily be limited to:
      a. Flow and tamper switches - including any remote locations such as backflow preventer vaults, water supply post indicating valves, etc.
      b. Waterflow signals ensure the immediate shut down of associated HVLS fans per NFPA 13, 11.1.7.

B. Requirements:
   1. Materials and installation to meet or exceed the requirements of NFPA 13, prevailing edition and the local Authority Having Jurisdiction (AHJ).
   2. All components of the system shall be UL listed for the intended service.
   3. Provide components with minimum pressure ratings as suited for system working pressure(s).

2.2 VALVES

A. General requirements:
   1. Valves shall be rated for no less than 175 psi.
   2. All valves controlling connections to water supplies and to supply pipes to sprinklers shall be listed indicating valves.
   3. Drain and test valves shall be approved.
   4. All control, drain, venting, and test connection valves shall be provided with permanently marked weatherproof metal identification signs.
   5. Provide as indicated on the Drawings and configured in accordance with the requirements of the local Authority Having Jurisdiction.
   6. A listed relief valve not less than 1/2" in size shall be provided on each wet pipe system, in accordance with NFPA 13 requirements. Provide a piped drain line to the outdoors for each such valve.

B. Alarm Valves
   1. Riser alarm valves shall be UL listed, FM approved alarm check valve type complete with pressure actuated switch or riser check valve type with a listed vane type waterflow alarm switch.

a. Approved pressure gauges shall be provided on both the supply and system sides of the valve.
b. Valve body shall include a removable cover for check clapper access.

2. Local waterflow alarm devices shall be a listed water-motor operated device or an electrified bell type for outdoor installation. Additionally, provide an electrified bell for indoor installation. System Sensor, Potter, or Reliable.
3. Provide connectivity to the building fire alarm system.
4. Acceptable valve manufacturers:
   a. Reliable
   b. Viking
   c. Tyco-Grinnell

C. Control Valves (Gate)
1. Control valves shall be UL listed, FM approved resilient wedge gate type.
2. Provide ductile iron bodied & fusion bonded epoxy coated, with EPDM coated ductile iron wedge, rising stem, outside screw and yoke type. Grooved ends for 2" and smaller, flanged ends for 2-1/2" and larger.
3. Acceptable manufacturers:
   a. Reliable
   b. Viking
   c. Tyco-Grinnell

D. Control Valves (Butterfly)
1. Control valves shall be UL listed, FM approved ductile iron bodied, gear operated with flag, butterfly type.
2. Acceptable manufacturers:
   a. Reliable
   b. Viking
   c. Tyco-Grinnell

E. Check Valves
1. Check valves shall be UL listed, FM approved ductile or cast iron bodied, bronze or brass seated, non-slam type, suited for horizontal or vertical installation.
2. Acceptable manufacturers:
   a. Viking
   b. Tyco-Grinnell

F. Test and Drain Valve Assemblies shall be UL listed, FM approved bronze bodied ball valve type complete with tamper resistant test orifice and sight glasses. AGF Manufacturing, Inc.

G. Automatic air release valve and vent assemblies shall be UL listed, FM approved and provided complete with brass or bronze bodied ball valves, stainless steel mesh strainers, and threaded drain outlet. Potter PAAR-B.

H. Backflow Preventers: Provide as indicated on the Drawings and in accordance with the requirements of the water supplier and public health authority having jurisdiction. All such devices shall be listed for fire protection service.

2.3 PIPE AND FITTINGS

A. Underground service entry piping shall be: Ductile Iron Pipe, minimum pressure class 150, AWWA C151/A21.51.
   1. Fittings: Standard ductile iron, AWWA C110/A21.10.
   2. Joints: Rubber-gasketed and bolted mechanical joints, AWWA C111/A21.11. Installation shall be in accordance with AWWA C600 and approved pipe lubricant shall be used for optimum gasket sealing and long-term performance.
   3. Note: A single fitting may be installed below slab on grade to facilitate underground pipe entry up to above floor from an immediately adjacent exterior building wall.
   4. Provide continuous polyethylene encasement for all piping buried or in contact with concrete in accordance with AWWA C105/A21.5, beginning at no closer than the 5'-0" mark from the building and to a minimum of 6" above the finished floor.
   5. Provide an oversized steel sleeve for service stub up through slab and seal watertight.

B. All piping above grade shall be:
   1. ASTM A135/A135M / ASTM A53/A53M schedule 40 black steel pipe with roll-grooved ends, joined with mechanical couplings and with manufactured carbon steel grooved fittings with matching mechanical couplings for pipe 2-1/2" and larger. Fittings shall be fully metallically formed type with an independent gasket and coupling at each pipe connection. All coupling assembly points shall have bolts and nuts.
   2. ASTM A135/A135M / ASTM A795/A795M schedule 40 black steel threaded pipe and cast iron or malleable iron fittings for pipe 2" and smaller.
   3. Welding shall be acceptable only for providing ASTM A53/A53M shop welded, branch outlet fittings, UL Listed and FM Approved for use in fire sprinkler systems, in accordance with NFPA 13 and local AHJ requirements.
      a. Merit Manufacturing Corporation or pre-approved equal.
      b. In no case shall butt-welding of pipe ends be allowed.

C. Acceptable manufacturers:
   1. Wheatland Tube Company
   2. Bull Moose Tube Company
   3. Tex-Tube
   4. Allied Tube

D. Acceptable mechanical coupling manufacturers:
   1. Victaulic
   2. Tyco-Grinnell
   3. Anvil Gruvlok

E. **Regardless of manufacturer, the use of pipe hole-cut, gasketed bolt-on branch outlets shall not be permitted. This prohibition includes, but is not necessarily limited to, the following: clamp-T, mechanical-T, outlet-T, strap-T, and U-bolt-T outlet connectors.**

F. In all locations subject to corrosive conditions, ensure to provide a suitable epoxy (spray) coating to all exposed surfaces of pipe and fittings. Such locations shall include, but not necessarily be limited to, the following: natatoriums, pool equipment rooms, chemical and metal process areas, and animal pens. All job-applied protective coatings shall be provided as approved and only after verification that the proper piping has been installed, per the markings along the length of the pipe.

2.4 SPRINKLER HEADS

A. Suspended Ceiling Type: Standard Concealed pendant type with **chrome** cover plate.

B. Exposed Area Type: Standard upright type with brass finish.

C. Sidewall Type: Chrome plated finish with matching escutcheon.

D. Where maximum ceiling temperatures exceed 100 degrees F, sprinklers with temperature ratings in accordance with maximum ceiling temperatures as tabulated in NFPA 13 shall be provided. Sprinkler heads within a given compartment must all be of the same temperature rating. Ambient ceiling temperatures expected in the vicinity of the sprinklers must be considered accordingly.
   1. Possible high ambient temperature areas may include, but are not necessarily limited to, the following: electrical equipment rooms, kiln rooms, and manufacturing/process spaces.
   2. Unless conditions dicate otherwise, provide "white" color coded (intermediate temperature classification) heads in kiln rooms.

E. Sprinkler heads of the “O”-ring seal type are not acceptable.

F. In all locations subject to corrosive conditions provide heads entirely constructed of stainless steel or heads with polyester coated finish and dipped in wax. Such locations shall include, but not necessarily be limited to, the following: natatoriums, pool equipment rooms, chemical and metal process areas, and animal pens.

G. In all locations subject to occupant abuse or vandalism provide institutional type sprinkler heads with tamper-resistant construction and suitable “break-away” weight test documentation from the manufacturer. Such locations shall include, but not necessarily be limited to, the following: patient areas of institutional mental health occupancies, prisoner areas (cells, etc.) of correctional facilities – jails, prisons, juvenile detention facilities.

H. Flexible type sprinkler head connections are not acceptable.

I. Acceptable manufacturers:
   1. Tyco-Grinnell
   2. Viking
   3. Reliable

2.5 FIRE DEPARTMENT CONNECTIONS

A. Refer to Section 21 00 00 for all such requirements.

2.6 INSULATION

A. All piping and valves exposed to the weather or within building and exposed to the weather shall be insulated with phenolic foam with ASJ and all joints sealed. Insulation density shall not be less than 1.5 pounds per cubic foot, and conductivity (K) not higher than 0.25 and 75 degrees F mean temperature difference, with factory applied all weather vapor barrier jacket.

B. All insulated pipe and valves subject to damage shall be protected with an aluminum jacket with sealed joints.

C. Refer to Section 22 07 19 for detailed specifications.

PART 3 - EXECUTION

3.1 GENERAL

A. All equipment shall be installed in accordance with the manufacturer's recommendations and printed installation instructions.

B. All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items as required by NFPA 13 and installed as per manufacturer's recommendations.

3.2 DESIGN

A. Design spacing of sprinkler heads and selection sizes shall conform to the requirements of NFPA 13 for the occupancy hazard.

B. Uniform discharge density design shall be based on hydraulic calculations utilizing the method outlined in NFPA 13. Density of discharge from sprinkler heads shall conform to NFPA 13.

C. Friction losses in pipe will be based on a value of "C" =120 in the Hazen - Williams formula for steel pipe and "C" =150 for listed CPVC pipe (only if specified).

D. Design and install the system so that no part will interfere with doors, windows, heating, plumbing, or electrical equipment. Do not locate sprinkler heads within 6 inches of lighting fixtures, HVAC diffusers and other obstructions. Sprinkler piping cannot penetrate ductwork, structural members, or lighting fixtures.

E. The Contractor shall conform to NFPA 13, prevailing edition. Special attention shall be given to the Chapters on Plans and Calculations and on Systems Acceptance. It shall be the Licensed Fire Sprinkler Contractor's responsibility to determine if any deficiencies exist, such as an inadequate water supply, or any other item which would materially affect the acceptability of the system.

F. Design sprinkler system piping accordingly and provide hose connections complete with valves, hoses, and cabinets where and as required by code. Adhere to the acceptable manufacturers listed in Section 21 00 00. Locations shall include, but are not necessarily limited to, the following: theatrical stages greater than 1,000 square feet.

G. Reference the latest architectural reflected ceiling plans. Extend branch lines accordingly to provide sprinklers both above and below "cloud" ceilings, where present and as required.

H. Ensure to provide sprinklers under fixed obstructions (such as ductwork) over 48 inches wide.

3.3 INSTALLATION - GENERAL

A. Install all items in accordance with applicable codes.

B. Install piping so that mains and branches are not located directly underneath HVAC equipment or other items needing access.

C. Do not install risers or mains in MDF/IDF/Data closets or electrical rooms. Where sprinkler protection is provided, only the associated branch lines and sprinkler heads shall be allowed in such spaces.

D. Furnish additional heads which may be required for coordinated ceiling patterns without added cost, even though number of heads may exceed minimum code requirements.

E. Provide a printed sheet giving brief instructions relative to all necessary aspects of sprinkler controls and emergency procedures next to sprinkler riser mains. Instruction sheet shall be protected by a glass or a transparent plastic cover.

F. All sprinkler heads shall be located as near the center of ceiling tiles as is practical (±1/2”). Location shall present a uniform pattern with all heads aligned when completely installed.

G. Run piping concealed above furred ceilings and in joist space to minimize obstructions. Expose only heads.
   1. Exact routing of piping shall be approved by Architect or relocated as required at no additional cost to Owner.
   2. If piping must be exposed, provide at a minimum of 9'-0" AFF, unless specifically approved otherwise by the Owner.

H. Provide wire guards on all pendant and upright sprinklers heads subject to damage, including, but not necessarily limited to, the following locations: mechanical rooms, gymnasiums, athletic areas, wood and metal shops.

I. Locate outside alarms on wall of building adjacent to sprinkler riser room.

J. Provide on wall near the sprinkler valve(s): a clearly labeled and suitably sized cabinet containing (a minimum of 5% but no less than six) spare sprinkler heads of each type and a wrench suitable for each head type.

K. Provide no less than twelve (12) spare escutcheons for each type and color of sprinkler head.

L. Provide framed zone map(s) at the riser location(s) clearly indicating the geographical area protected by each zone valve/floor control assembly.

M. Provide 1 inch diameter nipple and 1 inch x 1/2 inch reducing fitting for each upright head.

3.4 INSTALLATION - DRAINAGE

A. All sprinkler pipe and fittings shall be installed so that the system can be drained.

B. Unless not practicable, all piping shall be arranged to drain to the main drain valve for each sprinkler system. Make provisions accordingly for any trapped piping and provide auxiliary drains as necessary, complete with signage, and in accordance with NFPA 13 requirements.

C. Unless noted otherwise on the Drawings or in conflict with Owner requirements, all drains shall discharge to the outdoors at locations free from the possibility of causing water damage. Each such drain shall be provided with a chrome wall escutcheon and 45 degree galvanized ell turned down.

3.5 PAINTING AND PIPE IDENTIFICATION

A. Refer to Section 21 00 00 for all such requirements.

3.6 REPLACEMENT

A. Upon receipt of written notice of failure of any part of the guaranteed equipment during the guaranteed period, the Contractor will replace the affected part or parts promptly at no additional cost.

3.7 TESTING

A. Prior to testing, the entire sprinkler system shall be thoroughly flushed clean.

B. Upon completion of the installation and flushing, test the system and obtain approval of the local fire insurance rating organization having jurisdiction. Particular attention is called to the acceptance requirements of NFPA 13.

C. Testing and acceptance must be provided for underground and aboveground piping per NFPA 13 and local AHJ requirements. Documentation of such shall be provided to the Owner.

3.8 TRAINING

A. The Owner's maintenance staff shall be fully briefed in the normal start-up of the system, operation, normal and emergency shutdown, and maintenance of the system.

B. Routine maintenance, yearly maintenance, and any seasonal requirements or considerations shall be fully discussed and documented.

C. Names of those instructed and dates, as well as a list of information provided to the Owner shall be included in the final report.

END OF SECTION 21 13 13

SECTION 22 02 00 - BASIC MATERIALS AND METHODS FOR PLUMBING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all Work herein.

B. The Contract Drawings indicate the extent and general arrangement of the systems. If any departure from the Contract Drawings is deemed necessary by the Contractor, details of such departure and the reasons therefore shall be submitted to the Architect/Engineer for approval as soon as reasonably practicable. No such departures shall be made without the prior written approval of the Architect/Engineer.

C. Notwithstanding any reference in the Specifications to any article, device, product, material, fixture, form or type of construction by name, make or catalog number, such reference shall not be construed as limiting competition; and the Contractor, in such cases, may at his option use any article, device, product, material, fixture, form or type of construction which in the judgment of the Architect/Engineer, expressed in writing, is equal to that specified.

D. All first floor plumbing pipiing to be installed in a crawlspace where possible.

E. Hang all piping in crawl spaces from the structure at an accessable height

F. Contractor shall notify Dallas ISD designated representative at completion of all project phases.

G. Contractor shall provide city green tags for every phase of plumbing work completed to Dallas ISD designated representative.

1.2 SCOPE OF WORK

A. The Work included under this Contract consists of the furnishing and installation of all equipment and material necessary and required to form the complete and functioning systems in all of their various phases, all as shown on the accompanying Drawings and/or described in these Specifications. The Contractor shall review all pertinent Drawings, including those of other contracts, prior to commencement of Work.

B. This Division requires the furnishing and installing of all items as specified herein, indicated on the Drawings, or reasonably inferred as necessary for safe and proper operation; including every article, device or accessory (whether or not specifically called for by item) reasonably necessary to facilitate each system's functioning as indicated by the design and the equipment specified. Elements of the work include, but are not limited to: materials, labor, supervision, transportation, storage, equipment, utilities, all required permits, licenses and inspections. All work performed under this Section shall be in accordance with the Project Manual, Drawings and Specifications and is subject to the terms and conditions of the Contract.

C. The approximate locations of Plumbing and Fire Protection items are indicated on the Drawings. These Drawings are not intended to give complete and accurate details with regards to location of outlets, apparatus, etc. Exact locations are to be determined by actual measurements at the building/job-site, and will in all cases be subject to the Review of the Owner or Engineer, who reserves the right to make any reasonable changes in the locations indicated without additional cost to the Owner.

D. Items specifically mentioned in the Specifications but not shown on the Drawings and/or items shown on Drawings but not specifically mentioned in the Specifications shall be installed by the Contractor under the appropriate section of work as if they were both specified and shown.

E. All discrepancies between the Contract Documents and actual job-site conditions shall be reported to the Owner or Engineer so that they will be resolved prior to bidding. Where this cannot be done at least seven (7) working days prior to bid; the greater or more costly of the discrepancy shall be bid. All labor and materials required to perform the work described shall be included as part of this Contract.

F. It is the intention of this Section of the specifications to outline minimum requirements to furnish the Owner with a turn-key and fully operating system in cooperation with other trades.

G. It is the intent of the above "Scope" to give the Contractor a general outline of the extent of the Work involved; however, it is not intended to include each and every item required for the Work. Anything omitted from the "Scope" but shown on the Drawings, or specified elsewhere, or necessary for complete and functioning plumbing systems shall be considered a part of the overall "Scope".

H. The Contractor shall rough-in fixtures and equipment furnished by others from rough-in and placement drawings furnished by others. The Contractor shall make final connection to fixtures and equipment furnished by others.

I. The Contractor shall participate in the Commissioning process as required; including, but not necessarily limited to: meeting attendance, completion of checklists, and participation in functional testing.

1.3 SCHEMATIC NATURE OF CONTRACT DOCUMENTS

A. The contract documents are schematic in nature in that they are only to establish scope and a minimum level of quality. They are not to be used as actual working construction drawings. The actual working construction drawings shall be the reviewed Shop Drawings.

B. All piping, fixture, or equipment locations as indicated on the documents do not indicate every transition, offset, or exact location. All transitions, offsets, clearances and exact locations shall be established by actual field measurements, coordination with the structural, architectural and reflected ceiling plans, and other trades. Submit Shop Drawings for review.

C. All transitions, offsets and relocations as required by actual field conditions shall be performed by the Contractor at no additional cost to the owner.

D. Additional coordination with Electrical Subcontractor may be required to allow adequate clearances of electrical equipment, fixtures, and associated appurtenances. Contractor to notify Architect and Engineer of unresolved clearances, conflicts, or equipment locations.

1.4 SITE VISIT AND FAMILIARIZATION

A. Before submitting a bid, it will be necessary for each Contractor whose work is involved to visit the site and ascertain for himself the conditions to be met therein in installing his work and make due provision for same in his bid. It will be assumed that this Contractor in submitting his bid has visited the premises and that his bid covers all work necessary to properly install the piping, fixtures and equipment shown. Failure on the part of the Contractor to comply with this requirement shall not be considered justification for the omission or faulty installation of any work covered by these Specifications and Drawings.

B. Understand the existing utilities from which services will be supplied; verify locations of utility services, and determine requirements for connections.

C. Determine in advance that equipment and materials proposed for installation fit into the confines indicated.

1.5 WORK SPECIFIED IN OTHER SECTIONS

A. Finish painting is specified. Prime and protective painting is included in the work of this Division.

B. Owner and General Contractor furnished equipment shall be properly connected to plumbing systems.

C. Furnishing and installing all required plumbing equipment, control relays and electrical interlock devices, conduit, wire and junction boxes are included in the Work of this Division.

1.6 PERMITS, TESTS, INSPECTIONS

A. Arrange and pay for all permits, fees, tests, and all inspections as required by governmental authorities.

B. Per Dallas ISD requirements, advance notification shall be provided to district maintenance staff when scheduling any mechanical-electrical-plumbing inspections by the City. The following district personnel shall be notified:
   1. Bart Webster - Maintenance MEP Director, bawebster@dallasis
   2. Bart Braswell - Maintenance Plumbing Manager, bbraswell@dallasisd.org
   3. George Lakes - Maintenance Electrical Manager, glakes@dallasisd.org
   4. Miguel Soto - Maintenance HVAC Manager, misoto@dallasisd.org
   5. Dallas ISD Project Construction Manager

1.7 DATE OF FINAL ACCEPTANCE

A. The date of final acceptance shall be the date of Owner occupancy, or the date all punch list items have been completed, or the date final payment has been received. Refer to Division 01 for additional requirements.

B. The date of final acceptance shall be documented in writing and signed by the Architect, Owner and Contractor.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

B. Deliver products to the project at such times as the project is ready to receive the equipment, pipe or valves - properly protected from incidental damage and weather damage.

C. Damaged equipment, valves or pipe shall be promptly removed from the site and new, undamaged equipment, valves and pipe shall be provided in its place promptly with no additional charge to the Owner.

1.9 NOISE AND VIBRATION

A. The plumbing systems and the component parts thereof shall be guaranteed to operate without objectionable noise and vibration.

B. Provide foundations, supports and isolators as specified or indicated, properly adjusted to prevent transmission of vibration to the building structure, piping and other items.

C. Carefully fabricate pipe and fittings with smooth interior finish to prevent turbulence and generation or regeneration of noise.

D. All equipment shall be selected to operate with minimum of noise and vibration. If, in the opinion of the Architect/Engineer, objectionable noise or vibration is produced or transmitted to or through the building structure by equipment, piping or other parts of the Work, the Contractor shall rectify such conditions without extra cost to the Owner.

1.10 APPLICABLE CODES

A. Obtain all required permits and inspections for all work required by the Contract Documents and pay all required fees in connection thereof.

B. Arrange with the serving utility companies for the connection, relocation, and upgrade of all required utilities and pay all charges, meter charges, connection fees and inspection fees, if required.

C. Comply with all applicable codes, specifications, local ordinances, industry standards, utility company regulations and the applicable requirements of the following nationally accepted codes and standards, including, but not necessarily limited to:
   1. American Standards Association, ASA.
   2. American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc., ASHRAE.
   3. American Society of Mechanical Engineers, ASME.
   4. American Society of Plumbing Engineers, ASPE.
   5. American Society of Testing Materials, ASTM.
   6. American Water Works Association, AWWA.
   7. National Bureau of Standards, NBS.
   8. National Fire Protection Association, NFPA.
   9. UL, LLC (formerly Underwriters Laboratories).
   10. FM Global.
   11. International Energy Conservation Code, IECC.

12. International Fire Code.
13. International Fuel Gas Code.
14. International Plumbing Code.

D. Where differences exist between the Contract Documents and applicable state or city building codes, state and local ordinances, industry standards, utility company regulations and the applicable requirements of the above listed nationally accepted codes and standards, the more stringent or costly application shall govern. Promptly notify the Architect/Engineer in writing of all differences.

E. When directed in writing by the Architect/Engineer, remove all work installed that does not comply with the Contract Documents and applicable state or city building codes, state and local ordinances, industry standards, utility company regulations and the applicable requirements of the above listed nationally accepted codes and standards. Correct the deficiencies and complete the work at no additional cost to the Owner.

1.11 DEFINITIONS AND SYMBOLS

A. General Explanation: A substantial amount of construction and Specification language constitutes definitions for terms found in other Contract Documents, including Drawings which must be recognized as diagrammatic and schematic in nature and not completely descriptive of requirements indicated thereon. Certain terms used in Contract Documents are defined generally in this article, unless defined otherwise in Division 01.

B. Definitions and explanations of this Section are not necessarily either complete or exclusive, but are general for work to the extent not stated more explicitly in another provision of the Contract Documents.

C. Indicated: The term "Indicated" is a cross-reference to details, notes or schedules on the Drawings, to other paragraphs or schedules in the Specifications and to similar means of recording requirements in Contract Documents. Where such terms as "Shown", "Noted", "Scheduled", "Specified" and "Detailed" are used in lieu of "Indicated", it is for the purpose of helping the reader locate cross-reference material, and no limitation of location is intended except as specifically shown.

D. Directed: Where not otherwise explained, terms such as "Directed", "Requested", "Accepted", and "Permitted" mean by the Architect or Engineer. However, no such implied meaning will be interpreted to extend the Architect's or Engineer's responsibility into the Contractor's area of construction supervision.

E. Reviewed: Where used in conjunction with the Engineer's response to submittals, requests for information, applications, inquiries, reports and claims by the Contractor the meaning of the term "Reviewed" will be held to limitations of Architect's and Engineer's responsibilities and duties as specified in the General and Supplemental Conditions. In no case will "Reviewed" by Engineer be interpreted as a release of the Contractor from responsibility to fulfill the terms and requirements of the Contract Documents.

F. Furnish: Except as otherwise defined in greater detail, the term "Furnish" is used to mean supply and deliver new to the project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.

G. Install: Except as otherwise defined in greater detail, the term "Install" is used to describe operations at the project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations, as applicable in each instance.

H. Provide: Except as otherwise defined in greater detail, the term "Provide" is used to mean "Furnish and Install", complete and ready for intended use, as applicable in each instance.

I. Installer: Entity (person or firm) engaged by the Contractor or its Subcontractor for performance of a particular unit of work at the project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations, as applicable in each instance. It is a general requirement that such entities (Installers) be expert in the operations they are engaged to perform.

J. Imperative Language: Used generally in Specifications. Except as otherwise indicated, requirements expressed imperatively are to be performed by the Contractor. For clarity of reading at certain locations, contrasting subjective language is used to describe responsibilities that must be fulfilled indirectly by the Contractor, or when so noted by other identified installers or entities.

K. Minimum Quality/Quantity: In every instance, the quality level or quantity shown or specified is intended as minimum quality level or quantity of work to be performed or provided. Except as otherwise specifically indicated, the actual work may either comply exactly with that minimum (within specified tolerances), or may exceed that minimum within reasonable tolerance limits. In complying with requirements, indicated or scheduled numeric values are either minimums or maximums as noted or as appropriate for the context of the requirements. Refer instances of uncertainty to Owner or Engineer via a request for information (RFI) for decision before proceeding.

L. Abbreviations and Symbols: The language of Specifications and other Contract Documents including Drawings is of an abbreviated type in certain instances, and implies words and meanings which will be appropriately interpreted. Actual word abbreviations of a self-explanatory nature have been included in text of Specifications and Drawings. Specific abbreviations and symbols have been established, principally for lengthy technical terminology and primarily in conjunction with coordination of Specification requirements with notations on Drawings and in Schedules. These are frequently defined in Section at first instance of use or on a Legend and Symbol Drawing. Trade and industry association names and titles of generally recognized industry standards are frequently abbreviated. Singular words will be interpreted as plural and plural words will be interpreted as singular where applicable and where full context of Contract Documents so indicate. Except as otherwise indicated, graphic symbols and abbreviations used on Drawings and in Specifications are those recognized in construction industry for indicated purposes. Where not otherwise noted symbols and abbreviations are defined by 2009 ASHRAE Fundamentals Handbook, chapter 34 "Abbreviations and Symbols", ASME and ASPE published standards.

1.12 DRAWINGS AND SPECIFICATIONS

A. These Specifications are intended to supplement the Drawings. It will not be the province of the Specifications to mention any part of the work which the Drawings are competent to fully explain in every particular and such omission shall not to relieve the Contractor from carrying out portions indicated on the Drawings only.

B. Should items be required by these Specifications and not indicated on the Drawings, they are to be supplied even if of such nature that they could have been indicated thereon. In case of disagreement between Drawings and Specifications, or within either Drawings or Specifications, the better quality or greater quantity of work shall be estimated and the matter referred to the Architect or Engineer for review with a request for information and clarification at least seven (7) working days prior to bid opening date for issuance of an addendum.

C. The listing of product manufacturers, materials and methods in the various sections of the Specifications, and indicated on the Drawings, is intended to establish a standard of quality only. It is not the intention of the Owner or Engineer to discriminate against any product, material or method that is equal to the standards as indicated and/or specified, nor is it intended to preclude open, competitive bidding. The fact that a specific manufacturer is listed as an acceptable manufacturer should not be interpreted to mean that the manufacturers' standard product will meet the requirements of the project design, Drawings, Specifications and space constraints.

D. The Architect or Engineer and Owner shall be the sole judge of quality and equivalence of equipment, materials and methods.

E. Products by other reliable manufacturers, other materials, and other methods, will be accepted as outlined, provided they have equal capacity, construction, and performance. However, under no circumstances shall any substitution by made without the written permission of the Architect or Engineer and Owner. Request for prior approval must be made in writing at least ten (10) days prior to the bid date without fail.

F. Wherever a definite product, material or method is specified and there is not a statement that another product, material or method will be acceptable, it is the intention of the Owner or Engineer that the specified product, material or method is the only one that shall be used without prior approval.

G. Wherever a definite material or manufacturer's product is specified and the Specification states that products of similar design and equal construction from the specified list of manufacturers may be substituted, it is the intention of the Owner or Engineer that products of manufacturers that are specified are the only products that will be acceptable and that products of other manufacturers will not be considered for substitution without approval.

H. Wherever a definite product, material or method is specified and there is a statement that "OR EQUAL" product, material or method will be acceptable, it is the intention of the Owner or Engineer that the specified product, material or method or an "OR EQUAL" product, material or method may be used if it complies with the specifications and is submitted for review to the Engineer as outline herein.

I. Where permission to use substituted or alternative equipment on the project is granted by the Owner or Engineer in writing, it shall be the responsibility of the Contractor or Subcontractor involved to verify that the equipment will fit in the space available which includes allowances for all required Code and maintenance clearances, and to coordinate all equipment structural support, plumbing and electrical requirements and provisions with the Mechanical and Plumbing Design Documents and all other trades, including Division 26.

J. Changes in architectural, structural, electrical, mechanical, and plumbing requirements for the substitution shall be the responsibility of the bidder wishing to make the substitution. This shall include the cost of redesign by the affected designer(s). Any additional cost incurred by affected Subcontractors shall be the responsibility of this bidder and not the Owner.

K. If any request for a substitution of product, material or method is rejected, the Contractor will automatically be required to furnish the product, material or method named in the Specifications. Repetitive requests for substitutions will not be considered.

L. The Owner or Engineer will investigate all requests for substitutions when submitted in accordance with above and if accepted, will issue a written acceptance allowing the substitutions.

M. Where equipment other than that used in the design as specified or shown on the Drawings is substituted (either from an approved manufacturers list or by submittal review), it shall be the responsibility of the substituting Contractor to coordinate space requirements, building provisions and connection requirements with his trades and all other trades and pay all additional costs to other trades, the Owner, the Architect or Engineer, if any, due to the substitutions.

1.13 SUBMITTALS

A. Coordinate with Division 01 for submittal timetable requirements, unless noted otherwise within thirty (30) days after the Contract is awarded. The Contractor shall submit an electronic copy of a complete set of Shop Drawings and complete data covering each item of equipment or material. The submittal of each item requiring a submittal must be received by the Architect or Engineer within the above thirty (30) day period. The Architect or Engineer shall not be responsible for any delays or costs incurred due to excessive Shop Drawing review time for submittals received after the thirty (30) day time limit. The Architect and Engineer will retain a copy of all Shop Drawings for their files. All literature pertaining to items subject to Shop Drawing submittal shall be submitted at one time. Submittals shall be placed in one electronic file in PDF 8.0 format and bookmarked for individual specification sections. Individual electronic files of submittals for individual specifications shall not be permitted. Each submittal shall include the following items:
   1. A cover sheet with the names and addresses of the Project, Architect, MEP Engineer, General Contractor and the Subcontractor making the submittal. The cover sheet shall also contain the section number covering the item or items submitted and the item nomenclature or description.
   2. An index page with a listing of all data included in the Submittal.
   3. A list of variations page with a listing all variations, including unfurnished or additional required accessories, items or other features, between the submitted equipment and the specified equipment. If there are no variations, then this page shall state "NO VARIATIONS". Where variations affect the work of other Contractors, then the Contractor shall certify on this page that these variations have been fully coordinated with the affected Contractors and that all expenses associated with the variations will be paid by the submitting Contractor. This page will be signed by the submitting Contractor.
   4. Equipment information including manufacturer's name and designation, size, performance and capacity data as applicable. All applicable Listings, Labels, Approvals and Standards shall be clearly indicated.

5. Dimensional data and scaled drawings as applicable to show that the submitted equipment will fit the space available with all required Code and maintenance clearances clearly indicated and labeled at a minimum scale of 1/4" = 1'-0", as required to demonstrate that the alternate or substituted product will fit in the space available.
6. Identification of each item of material or equipment matching that indicated on the Drawings.
7. Sufficient pictorial, descriptive and diagrammatic data on each item to show its conformance with the Drawings and Specifications. Any options or special requirements or accessories shall be so indicated. All applicable information shall be clearly indicated with arrows or another approved method.
8. Additional information as required in other Sections of this Division.
9. Certification by the General Contractor and Subcontractor that the material submitted is in accordance with the Drawings and Specifications, signed and dated in long hand. Submittals that do not comply with the above requirements shall be returned to the Contractor and shall be marked "REVISE AND RESUBMIT".

B. Refer to Division 00 and Division 01 for additional information on Shop Drawings and submittals.

C. Equipment and materials submittals and Shop Drawings will be reviewed for compliance with design concept only. It will be assumed that the submitting Contractor has verified that all items submitted can be installed in the space allotted. Review of Shop Drawings and submittals shall not be considered as a verification or guarantee of measurements or building conditions.

D. Where Shop Drawings and submittals are marked "REVIEWED", the review of the submittal does not indicate that submittals have been checked in detail nor does it in any way relieve the Contractor from his responsibility to furnish material and perform work as required by the Contract Documents.

E. Shop Drawings shall be reviewed and returned to the Contractor with one of the following categories indicated:
   1. REVIEWED: Contractor need take no further submittal action, shall include this submittal in the O&M manual and may order the equipment submitted on.
   2. REVIEWED AS NOTED: Contractor shall submit a letter verifying that required exceptions to the submittal have been received and complied with including additional accessories or coordination action as noted, and shall include this submittal and compliance letter in the O&M manual. The Contractor may order the equipment submitted on at the time of the returned submittal providing the Contractor complies with the exceptions noted.
   3. NOT APPROVED: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is not approved, the Contractor will automatically be required to furnish the product, material or method named in the Specifications and/or Drawings. Contractor shall not order equipment that is not approved. Repetitive requests for substitutions will not be considered.
   4. REVISE AND RESUBMIT: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is marked revise and resubmit, the Contractor will automatically be required to furnish the product, material or method named in the Specifications and/or provide as noted on previous Shop Drawings. Contractor shall not order equipment marked revise and resubmit. Repetitive requests for substitutions will not be considered.

5. CONTRACTOR'S CERTIFICATION REQUIRED: Contractor shall resubmit submittal on material, equipment or method of installation. The Contractor's stamp is required stating the submittal meets all conditions of the contract documents. The stamp shall be signed by the General Contractor. The submittal will not be reviewed if the stamp is not placed and signed on all Shop Drawings.
6. MANUFACTURER NOT AS SPECIFIED: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is marked manufacturer not as specified, the Contractor will automatically be required to furnish the product, material or method named in the specifications. Contractor shall not order equipment where submittal is marked manufacturer not as specified. Repetitive requests for substitutions will not be considered.

F. Materials and equipment which are purchased or installed without Shop Drawing review shall be at the risk of the Contractor and the cost for removal and replacement of such materials and equipment and related work which is judged unsatisfactory by the Owner or Engineer for any reason shall be at the expense of the Contractor. The responsible Contractor shall remove the material and equipment noted above and replace with specified equipment or material at his own expense when directed in writing by the Architect or Engineer.

G. Shop Drawing Submittals shall be complete and checked prior to submission to the Engineer for review.

H. Submittals are required for, but not necessarily limited to, the following items:
1. Basic Materials.
2. Plumbing Fixtures and Valves.
3. Supports and Carriers.
4. Floor Drains, Roof Drains, and Cleanouts.
5. Water Heaters and Boilers.
6. Expansion Tanks.
7. Plumbing Piping.
8. Piping, Vessel, and Equipment Insulation.
9. Expansion Fittings and Devices.
10. Pipe and Equipment Hangers and Supports.
11. Test, Adjust and Balance Reports.
12. Testing, Adjusting and Balancing Contractor Qualifications.
13. Coordination Drawings.

I. Refer to other Division 22 sections for additional Shop Drawing and submittal requirements. Provide samples of actual materials and/or equipment to be used on the Project upon request of the Owner or Engineer.

1.14 COORDINATION DRAWINGS

A. Prepare coordination drawings to a scale of 1/4"=1'-0" or larger; detailing major elements, components, and systems of plumbing equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:
1. Indicate the proposed locations of pipe, equipment, and other materials. Include the following:

a. Wall locations and types.
b. Clearances for installing and maintaining insulation.
c. Locations of light fixtures and sprinkler heads.
d. Clearances for servicing and maintaining equipment, including tube removal and space for equipment disassembly required for periodic maintenance.
e. Equipment connections and support details.
f. Exterior wall and foundation penetrations.
g. Routing of storm, sanitary sewer piping and plumbing piping.
h. Fire-rated wall and floor penetrations.
i. Sizes and location of required concrete pads and bases.
j. Valve stem movement.
k. Structural floor, wall and roof opening sizes and details.

2. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
3. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.

B. This Contractor shall be responsible for coordination of all items that will affect the installation of the work of this Division. This coordination shall include, but not be limited to: voltage, ampacity, capacity, electrical and piping connections, space requirements, sequence of construction, building requirements and special conditions.

C. By submitting Shop Drawings on the project, this Contractor is indicating that all necessary coordination has been completed and that the systems, products and equipment submitted can be installed in the building and will operate as specified and intended, in full coordination with all other Contractors and Subcontractors.

1.15 RECORD DOCUMENTS

A. Prepare Record Documents in accordance with the requirements of Division 00 and Division 01, in addition to the requirements specified in Division 22.

B. The Contractor shall maintain a separate set of clearly and legibly marked Record Drawings on the job site to record all changes and modifications, including, but not limited to the following: work details, alterations to meet site conditions, and changes made by "Change Order" notices. Mark the drawings with colored pencil(s). These shall be available for review by the Owner, Architect or Engineer during the entire construction stage.

C. The Record Drawings shall be updated concurrently as construction progresses, and in no case less frequently than a daily basis. They shall indicate accurate dimensions for all buried or concealed work; precise locations of all concealed pipe; locations of all valves, controls and operable devices; and any deviations from the work shown on the Construction Documents. All dimensions shall include at least two dimensions to permanent structure points.

D. Record Drawings shall indicate, at a minimum, the following installed conditions:
1. Mains and branches of piping systems, with valves and control devices located and numbered, unions located, and with items requiring maintenance located (i.e., traps, strainers, expansion fittings, tanks, etc.). Valve location diagrams, complete with valve tag chart. Indicate actual inverts and horizontal locations of underground piping.
2. Equipment locations (exposed and concealed), dimensioned from prominent building lines.

3. Approved substitutions, Contract Modifications, and actual equipment and materials installed.
4. Contract Modifications, actual equipment and materials installed.

E. Engage the services of a Land Surveyor or Professional Engineer registered in the state in which the project is located as specified herein to record the locations and invert elevations of underground installations.

F. If the Contractor does not keep an accurate set of Record Documents, the pay request may be altered or delayed at the request of the Architect. Delivery of Record Documents is a condition of final acceptance. Record Drawings shall be furnished in addition to Shop Drawings.

G. Upon completion of the Work, the Contractor shall submit three (3) full size sets of Record Drawing prints to the Architect or Engineer for review prior to scheduling the final inspection at the completion of the work. The drawings shall have the name(s) and seal(s) of the Engineer(s) removed or blanked out and shall be clearly marked and signed on each sheet as follows:

CERTIFIED RECORD DRAWINGS
DATE:
(NAME OF GENERAL CONTRACTOR)
BY: _____
(SIGNATURE)
(NAME OF GENERAL CONTRACTOR)
BY: _____
(SIGNATURE)

1.16 CERTIFICATIONS AND TEST REPORTS

A. Submit a detailed schedule for completion and testing of each system indicating scheduled dates for completion of system installation and outlining tests to be performed and scheduled dates for each test. This detailed completion and test schedule shall be submittal at least ninety (90) days before the projected Project completion date.

B. Test result reporting forms shall be submitted for review no later than the date of the detailed schedule submitted.

C. Submit four (4) copies of all certifications and test reports to the Architect or Engineer for review adequately in advance of completion of the Work to allow for remedial action as required to correct deficiencies discovered in equipment and systems.

D. Certifications and test reports to be submitted shall include, but not be limited to those items outlined in other Sections of Division 22.

1.17 OPERATIONS AND MAINTENANCE MANUALS

A. Prepare Operations and Maintenance manuals in accordance with the requirements of Division 01 and Division 22. In addition to the requirements of other Sections, this shall include the following information for fixtures, specialties, and equipment items:
1. Identifying names, name tags designations and locations for all equipment.
2. Valve tag lists with valve number, type, color coding, location and function.
3. Reviewed Shop Drawing submittals with exceptions noted compliance letter.
4. Fabrication drawings.

5. Equipment and device bulletins and data sheets clearly highlighted to show equipment installed on the project and including performance curves and data as applicable, i.e., description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and model numbers of replacement parts.
6. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
7. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
8. Servicing instructions and lubrication charts and schedules.
9. Equipment and motor name plate data.
10. Wiring diagrams.
11. Exploded parts views and parts lists for all equipment and devices.
12. Color coding charts for all painted equipment and conduit.
13. Location and listing of all spare parts and special keys and tools furnished to the Owner.
14. Furnish recommended lubrication schedule for all required lubrication points with listing of type and approximate amount of lubricant required.

B. Coordinate with Division 01 for Operations and Maintenance manual requirements. Unless noted otherwise, bind together in “D ring” style three-ring binders (National model no. 79-883 or equivalent). Binders shall be large enough to allow 1/4” of spare capacity. Include three (3) sets with all approved Shop Drawing submittals, fabrication drawings, bulletins, maintenance instructions, operating instructions and parts exploded views and lists for each and every piece of equipment furnished under this Specification. All sections shall be typed and indexed into sections with tabbed insertable dividers, labeled for easy reference. Utilize the individual specification section numbers shown in the Plumbing Specifications as an organization guideline. Bulletins containing information about equipment that is not installed on the project shall be properly marked up or stripped and reassembled. All pertinent information required by the Owner for proper operation and maintenance of equipment supplied by Division 22 shall be clearly and legibly set forth in memoranda that shall, likewise, be bound with bulletins.

C. In addition to the bound “hard-copy” Operation and Maintenance manuals referenced above, provide an identical electronic copy in searchable PDF format, with all sections bookmarked within the file for easy reference. Provide a USB flash drive with the final manual to the Owner.

D. Operating and Maintenance Manuals shall be turned over to the Owner or Engineer for review a minimum of fourteen (14) working days prior to the beginning of the operator training period.

E. Operating and Maintenance Manuals which the Engineer deems incomplete, poorly organized, or otherwise unacceptable will be rejected in writing. The Contractor will subsequently be required to again turn over Operating and Maintenance Manuals, with all deficiencies corrected, until deemed acceptable by the Engineer.

1.18 COMMUNICATION WITH OWNER

A. Ensure to notify the designated Dallas ISD representative at the completion of all project phases of construction.

B. Ensure to provide city "green tags" for every phase of plumbing work completed to the designated Dallas ISD representative.

C. Ensure all equipment is installed per manufacturer's published recommendations and that such literature is submitted to the designated Dallas ISD representative.

D. Upon completion of new equipment installation and startup, ensure to provide Owner training on all installed equipment. For Owner/Operator Training:
   1. The Contractor shall furnish the services of factory trained specialists to instruct the Owner's operating personnel. The Owner's operator training shall include a minimum of 12 hours of on-site training in three (3) shifts of four (4) hours each.
   2. Before proceeding with the instruction of Owner's Personnel, prepare a typed outline in triplicate, listing the subjects that will be covered in this instruction, and submit the outline for review by the Owner. At the conclusion of the instruction period, obtain the signature of each person being instructed on each copy of the reviewed outline to signify that he or she has a proper understanding of the operation and maintenance of the systems and then resubmit the signed outlines.
   3. Refer to other Sections of Division 22 for additional Operator Training requirements.

1.19 FINAL COMPLETION

A. At the completion of the work, all equipment, operable appurtenances, and systems shall be tested. All faulty equipment and material shall be repaired or replaced. Refer to other Sections of Division 22 for additional requirements.

B. Clean and adjust all fixtures, flushometers, valves and operable devices. Replace faulty or otherwise damaged parts immediately prior to final acceptance.

C. Touch up and/or refinish any scratched equipment and devices immediately prior to final acceptance. This shall be acceptable only for minor superficial scratches, the determination of which rests solely on the judgment of the Architect or Engineer.

1.20 CONTRACTOR'S GUARANTEE

A. Use of the Plumbing systems to provide temporary service during the construction period shall not be allowed without written permission from the Owner, and, if granted, shall not be cause for the warranty period to start, except as defined below.

B. Contractor shall guarantee to keep the entire installation in repair and perfect working order for a period of one (1) year after its completion and final acceptance, and shall furnish free of additional cost to the Owner all materials and labor necessary to comply with the above guarantee throughout the year beginning from the date of issue of Substantial Completion, Beneficial Occupancy by the Owner, or the Certificate of Final Payment as agreed upon by all parties.

C. This guarantee shall not include cleaning or changing filters except as required by testing, adjusting and balancing.

D. All air compressors shall have parts and labor guarantees for a period of not less than five (5) years beyond the date of final acceptance.

E. Refer to other Sections of Division 22 for additional guarantee or warranty requirements.

1.21 TRANSFER OF ELECTRONIC FILES

A. Project documents are not intended or represented to be suitable for re-use by Architect/Owner or others on extensions of this project or on any other project. Any such re-use or modification without written verification or adaptation by Engineer, as appropriate for the specific purpose intended, will be at Architect/Owner's risk and without liability or legal exposure to Engineer or its consultants from all claims, damages, losses and expense, including attorney's fees arising out of or resulting thereof.

B. Because data stored in electric media format can deteriorate or be modified inadvertently, or otherwise without authorization of the data's creator, the party receiving the electronic files agrees that it will perform acceptance tests or procedures within sixty (60) days of receipt, after which time the receiving party shall be deemed to have accepted the data thus transferred to be acceptable. Any errors detected within the sixty (60) day acceptance period will be corrected by the party delivering the electronic files. Engineer is not responsible for maintaining documents stored in electronic media format after acceptance by the Architect/Owner.

C. When transferring documents in electronic media format, Engineer makes no representations as to the long-term compatibility, usability or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by Engineer at the beginning of the Project.

D. Any re-use or modifications will be Contractor's sole risk and without liability or legal exposure to Architect, Engineer or any consultant.

E. The Texas Board of Architectural Examiners (TBAE) has stated that it is in violation of Texas law for persons other than the Architect of record to revise the Architectural drawings without the Architect's written consent.
   1. It is agreed that "MEP" hard copy or computer-generated documents will not be issued to any other party except directly to the Architect/Owner. The Contract Documents are contractually copyrighted and cannot be used for any other project or purpose except as specifically indicated in AIA B-141 Standard Form of Agreement Between Architect and Owner.
   2. If the client, Architect or Owner of the project requires electronic media for "record purposes", then AutoCAD/ Revit documents will be prepared by Engineer on electronic media such as removable memory devices, flash drives or CD's. These documents can also be submitted via file transfer protocols. AutoCAD/ Revit files will be submitted with all title block references intact to permit the end user to only view and plot the drawings. Revisions will not be permitted in this configuration.
   3. At the Architect/Owner's request, Engineer will assist the Contractor in the preparation of the submittals and prepare one copy of AutoCAD/ Revit files on electronic media or submit through file transfer protocols. The electronic media will be prepared with all indicia of documents ownership removed. The electronic media will be prepared in a ".rvt" or ".dwg" format to permit the end user to revise the drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide materials and equipment manufactured by a domestic United States manufacturer and assembled in the United States for all local and Federal Government projects. These materials and equipment shall comply with “Buy American Act.”

B. Access Doors:
   1. Provide access doors as required for access to equipment, valves, controls, cleanouts and other apparatus where concealed.
   2. Provide access doors at gang restroom chases in the handicapped stall (on the men's/boys' side for back to back restrooms). 24" x24" size wherever possible but a minimum 18" x 18" size. Coordinate with Architect/wall-finish construction.
   3. Access doors shall have concealed hinges and screw driver cam locks unless indicated otherwise.

C. All access panels located in wet areas such as toilet rooms, locker rooms, shower rooms, natatoriums, kitchens, and any other wet areas shall be constructed of stainless steel.

D. Access doors shall be as follows:
   1. Plastic Surfaces: Milcor Style K.
   2. Ceramic Tile Surfaces: Milcor Style M.
   3. Drywall Surfaces: Milcor Style DW.
   4. Install panels only in locations approved by the Architect.

2.2 EQUIPMENT PADS

A. Provide four (4) inch high concrete pads for indoor floor mounted equipment. Pads shall conform to the shape of the equipment with a minimum extension of six (6) inches beyond the equipment. Top and sides of pads shall be troweled to a smooth finish, equivalent to the floor. External corners shall be bull-nosed to a 3/4" radius, unless shown otherwise.

B. Provide six (6) inch high concrete pads for all exterior mounted equipment. Pads shall conform to the shape of the equipment with a minimum extension of six (6) inches beyond the equipment. Provide a four (4) foot monolithic extension to the pad in front of the equipment for service when mounted on a non-finished area (i.e. landscape, gravel, clay, etc.) Top and sides of pads shall be troweled to a smooth finish. External corners shall be bull-nosed to a 3/4" radius, unless shown otherwise.

PART 3 - EXECUTION

3.1 ROUGH-IN

A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected via reviewed submittals.

B. Refer to equipment specifications in other Divisions (10, 11, 12, 13, 21, 22, etc.) for additional rough-in requirements as necessary and provide accordingly.

3.2 PLUMBING INSTALLATIONS

A. General: Sequence, coordinate, and integrate the various elements of plumbing and fire systems, materials, and equipment. Comply with the following requirements:
   1. Coordinate plumbing and fire protection systems, equipment, and materials installation with other building components.
   2. Verify all dimensions by field measurements.
   3. Arrange for chases, slots, leave-outs, and other openings in building components during progress of construction to allow for plumbing installations.
   4. Coordinate the installation of required supporting devices, sleeves, and pathways to be set in poured-in-place concrete and other structural components, as they are constructed.
   5. Sequence, coordinate, and integrate installations of plumbing materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
   6. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
   7. Coordinate connection of plumbing and fire protection systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
   8. Install systems, materials, and equipment to conform with architectural action markings on submittal, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, resolve conflicts and submit proposed solution to the Architect for review.
   9. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
   10. Install equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location and label.
   11. Install access panels or doors where valves, operable devices, and equipment are concealed behind finished surfaces. Refer to Article 2.1 of this Section and to Architectural documents for specifications and locations.
   12. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.
   13. Provide roof curbs for all roof mounted equipment. Coordinate with roof construction for pitched roof. Provide roof curb to match roof slope. Refer to architectural drawings and details.
   14. The equipment to be furnished under this Specification shall be essentially the standard product of the manufacturer. Where two or more units of the same class of equipment are required, these units shall be products of a single manufacturer; however, the component parts of the system need not be the product of the same manufacturer.
   15. The architectural and structural features of the building and the space limitations shall be considered in selection of all equipment. No equipment shall be furnished which will not suit the arrangement and space limitations indicated.
   16. Lubrication: Prior to start-up, check and properly lubricate all bearings as recommended by the manufacturer.

17. Where the word "Concealed" is used in these Specifications in connection with insulating, painting, piping, valves, etc., it shall be understood to mean hidden from sight as in chases, furred spaces or suspended ceilings. "Exposed" shall be understood to mean the opposite of concealed.
18. Identification of Plumbing Equipment:
    a. Plumbing equipment shall be identified by means of nameplates permanently attached to the equipment. Nameplates shall be engraved laminated plastic or etched metal. Shop Drawings shall include dimensions and lettering format for approval. Attachments shall be with escutcheon pins, self-tapping screws, or machine screws.
    b. Tags shall be attached to all valves, including control valves, with nonferrous chains. Tags shall be brass and at least 1-1/2 inches in diameter. Nameplate and tag symbols shall correspond to the identification symbols on the Record Drawings.

3.3 CUTTING AND PATCHING

A. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.

B. Perform cutting, fitting, and patching of plumbing equipment and materials required to:
1. Uncover Work to provide for installation of ill-timed Work.
2. Remove and replace defective Work.
3. Remove and replace Work not conforming to requirements of the Contract Documents.
4. Remove samples of installed Work as specified for testing.
5. Install equipment and materials in existing structures.
6. Upon written instructions from the Engineer, uncover and restore Work to provide for Engineer/Owner's observation of concealed Work, without additional cost to the Owner.
7. Patch existing finished surfaces and building components using new materials matching existing materials and experienced Installers. Patch finished surfaces and building components using new materials specified for the original installation and experienced Installers; refer to the materials and methods required for the surface and building components being patched; Refer to Article 1.11 DEFINITIONS AND SYMBOLS for definition of "Installer."

C. Cut, remove and legally dispose of selected plumbing equipment, components, and materials as indicated, including but not limited to removal of plumbing piping, equipment, plumbing fixtures and trim, and other plumbing items made obsolete by the new Work.

D. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

E. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

3.4 WORK SEQUENCE, TIMING, COORDINATION WITH OWNER, ARCHITECT AND ENGINEER

A. The Owner will cooperate with the Contractor, however, the following provisions must be observed:
1. A meeting will be held at the project site, prior to any construction, between the Owner's Representative, the General Contractor, the Subcontractors and the Architect/Engineer to discuss Contractor's employee parking space, access, storage of equipment or materials, and use of the Owner's facilities or utilities. The Owner's decisions regarding such matters shall be final.

2. During the construction of this project, normal facility activities will continue in existing buildings until renovated areas are completed. Plumbing, fire protection, lighting, electrical, communications, heating, air conditioning, and ventilation systems will have to be maintained in service within the occupied spaces of the existing building.

B. Start-up for major plumbing and fire protection equipment shall be performed by a factory authorized technician. Such equipment shall include, but not necessarily be limited to, the following: domestic water boilers and packaged water heating systems, water softeners, ultra-pure water equipment systems, domestic water booster pumps, fire pumps, and break tank level alarm systems. Refer to other Sections of Divisions 21 and 22 for additional requirements.

3.5 DEMOLITION AND WORK WITHIN EXISTING BUILDINGS

A. In the preparation of these documents every effort has been made to show the approximate locations of, and connections to the existing piping, utilities, equipment and other apparatus related to this phase of the work. However, this Contractor shall be responsible for verifying all of the above information. This Contractor shall visit the existing site to inspect the facilities and related areas. This Contractor shall inspect and verify all details and requirements of all the Contract Documents, prior to the submission of a proposal. All discrepancies between the Contract Documents and actual job-site conditions shall be resolved by this Contractor, who shall produce drawings that shall be submitted to the Architect/Engineer for review. All labor and materials required to perform the work described shall be a part of this Contract.

B. All equipment and/or systems noted on the Drawings "To Remain" shall be inspected and tested on site to certify its working condition.
   1. A written report on the condition of all equipment to remain, including a copy of the test results and recommended remedial actions and costs shall be made by this Contractor to the Architect/Engineer for review.
   2. Existing backflow prevention devices that are more than five (5) years old, however, shall be identified, removed, and replaced with new devices. Provide like devices one for one by an Owner approved manufacturer unless the prevailing code requires a higher level of cross-contamination protection, in which case this more stringent requirement shall govern the replacement device.

C. All equipment and/or systems noted on the Drawings "To Be Removed" shall be removed including, associated pipe, supports, and hangers. Where pipe is to be capped for future or end of line use, it shall be properly tagged with its function or service appropriately identified. Where existing equipment is to be removed or relocated and has an electric motor or connection, the Electrical Contractor shall disconnect motor or connection, remove wiring to a safe point and this Contractor shall remove or relocate motor or connection along with the equipment.

D. Ensure existing piping and equipment to remain that is adjacent to and impacted by the scope of Work is properly supported, fastened, and secure.

E. During the construction and remodeling, portions of the Project shall remain in service. Construction equipment, material tools, extension cords, etc., shall be arranged so as to present minimum hazard or interruption to the occupants of the building. None of the construction work shall interfere with the proper operation of the existing facility or be so conducted as to cause harm or danger to persons on the premises. All fire exits, stairs or corridors required for proper access, circulation or exit shall remain clear of equipment, materials or debris. The General Contractor shall maintain barricades, other separations in corridors and other spaces where work is conducted.

F. Demolition phase(s):
   1. Certain work during the demolition phase of construction may require overtime, night time, or weekend shifts or temporary evacuation of the occupants. Coordinate and schedule all proposed down time with the Owner at least seventy-two (72) hours in advance in writing.
   2. All abandoned pipe that cannot be removed shall be labeled, purged, and capped airtight at both ends. Abandonment of such piping shall first be pre-approved by the Owner's representative and shall be noted on the as-built drawings.

G. Any salvageable equipment as determined by the Owner, shall be delivered to the Owner, and placed in storage at the location of his choice. All other debris shall be removed from the site immediately and disposed of lawfully.

H. Equipment, piping or other potential hazards to the working occupants of the building or the general public shall not be left overnight outside of the designated working or construction area.

I. Make every effort to minimize damage to the existing building and the Owner's property. Repair, patch or replace as required any damage that occurs as a result of work at the site. Care shall be taken to minimize interference with the Owner's activities during construction and to keep construction disrupted areas to a minimum. Coordinate with the Owner and other trades in scheduling and performance of the work.

J. Include in the contract price all rerouting of existing pipe, utilities, etc., and the reconnecting of the existing equipment and plumbing fixtures as necessitated by field conditions to allow the installation of the new systems regardless of whether or not such rerouting, reconnecting or relocating is shown on the Drawings. Provide all temporary pipe, utilities, controls, etc., as required to maintain heating, cooling, ventilation and plumbing services for the existing areas with a minimum of interruption.

K. All existing plumbing fixtures, pipe, utilities, materials, equipment, controls and appurtenances not included in the remodel or alteration areas are to remain in place.

L. Pipe, utilities, equipment and controls serving mechanical, plumbing and owner's equipment, etc., which is to remain but which is served by pipe, utilities, equipment and controls that are disturbed by the remodeling work, shall be reconnected in such a manner as to leave this equipment in proper operating condition.

M. No portion of the fire protection systems shall be turned off, modified or changed in any way without the express knowledge and written permission of the Owner’s representative in order to protect systems that shall remain in service.

N. It is the intention of this Section of the Specifications to outline minimum requirements to furnish the Owner with a turn-key and operating system in cooperation with other trades with a minimum of disruption or downtime.

O. Refer to Architectural Demolition and/or Alteration plans for actual locations of walls, ceiling, etc., being removed and/or remodeled.

P. Where new connections are made to (buried) existing waste and vent piping that is not schedule 40 PVC solid wall DWV piping, the affected piping shall be replaced with schedule 40 PVC solid wall DWV piping.

END OF SECTION 22 02 00

SECTION 22 05 29 - HANGERS AND SUPPORT FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. The Basic Materials and Methods, Section 22 02 00, are included as a part of this Section as though written in full in this document.

1.2 WORK INCLUDED

A. Pipe, and equipment hangers, supports, and associated anchors.

B. Sleeves and seals.

C. Flashing and sealing equipment and pipe stacks.

1.3 RELATED WORK

A. Section 22 02 00 - Basic Materials and Methods for Plumbing

B. Section 22 07 19 - Plumbing Piping Insulation

C. Section 22 10 00 - Plumbing Piping

1.4 REFERENCES

A. ASME B31.1 - Power Piping; 2024.

B. ASME B31.9 - Building Services Piping; 2020.

C. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).

1.5 QUALITY ASSURANCE

A. Hangers and Supports for Plumbing Piping: In conformance with ASME B31.1 and ASME B31.9.

B. Hangers and Supports for Plumbing Piping: In conformance with MSS SP-58.

1.6 SUBMITTALS

A. Submit shop drawings and product data under provisions of Division One.

B. Indicate hanger and support framing and attachment methods.

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

A. Hangers for (Individual) Horizontal Pipe:
   1. Up to 100 foot run: Carbon steel, adjustable, clevis. MSS SP-58 Type 1.

2. Longer than 100 foot run: Adjustable roller hanger. MSS SP-58 Type 43.
3. Longer than 100 foot run, if indicated: Spring cushion roll. MSS SP-58 Type 49.

B. Hangers for (Multiple) Horizontal Pipe:
1. Trapeze, steel channels with welded spacers and hanger rods.
2. Provide with pipe roll and stand, MSS SP-58 Type 44, for piping runs 100 feet or longer and for piping 6 inches and larger.

C. **Under no circumstances will straps be allowed for hanging or supporting of plumbing piping.**

D. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.

E. Wall Support for Pipe Sizes 4 Inches and Over: adjustable steel yoke and cast iron roller.

F. Vertical Support: Steel riser clamp. MSS SP-58 Type 8 or 42.

G. Vertical Piping, at base: Variable spring base support. MSS SP-58 Type 52.

H. Floor Support for Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, locknut nipple, floor flange, and concrete pier or steel support.

I. Floor Support for Pipe Sizes 6 Inches and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.

J. Roof Pipe Supports and Hangers: Galvanized Steel Channel System as manufactured by Portable Pipe Hangers, Inc. or approved equal.

For pipes 2-1/2” and smaller	Type PP10 with roller
For pipes 3” through 8”	Type PS
For multiple pipes	Type PSE - Custom

K. Copper Pipe Support and Hangers: Electro-galvanized with thermoplastic elastomer cushions; Unistrut “Cush-A-Clamp” or equal. Hangers: Plastic coated; Unistrut or equal.

L. For installation of protective shields also reference Section 22 07 19.

M. Shields for Vertical Copper Pipe Risers: Sheet lead.

N. Pipe Rough-In Supports in Walls/Chases: Provide pre-formed plastic pipe supports, Sioux Chief “Pipe Titan”, Hold Rite or equal.

2.2 HANGER RODS

A. Galvanized Hanger Rods: Threaded both ends, threaded one end, or continuous threaded.

2.3 INSERTS

A. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.4 FLASHING

A. Metal Flashing: 20 gage galvanized steel.

B. Lead Flashing: 4 lb./sq. ft. sheet lead for waterproofing.

C. Caps: Steel, 20 gauge minimum; 16 gage at fire resistant elements.

D. Coordinate with roofing contractor/architect for type of flashing on metal roofs.

2.5 SLEEVES

A. Sleeves for Pipes Through Non-fire Rated Floors: Form with 18 gage galvanized steel, tack welded to form a uniform sleeve.

B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Form with steel pipe, schedule 40.

C. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fireproofing: Pre-fabricated fire rated steel sleeves including seals, UL listed.

D. Fire Stopping Insulation: Glass fiber type, non-combustible, UL listed.

E. Caulk: Paintable 25-year acrylic sealant.

F. Pipe Alignment Guides: Factory fabricated, of cast semi-steel or heavy fabricated steel, consisting of bolted, two-section outer cylinder and base with two-section guiding spider that bolts tightly to pipe. Length of guides shall be as recommended by manufacturer to allow indicated travel.

2.6 FABRICATION

A. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

B. Design hangers without disengagement of supported pipe.

C. Design roof supports without roof penetrations, flashing or damage to the roofing material.

2.7 FINISH

A. Exposed steel hangers, supports, and appurtenances shall be hot-dipped galvanized. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

PART 3 - EXECUTION

3.1 INSERTS

A. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams. Coordinate with structural engineer for placement of inserts.

B. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.

C. Where concrete slabs form finished ceiling, provide inserts to be flush with slab surface.

D. Where inserts are omitted, drill through concrete slab from below and provide thru-bolt with recessed square steel plate and nut recessed into and grouted flush with slab. Verify with structural engineer prior to start of work.

3.2 PIPE HANGERS AND SUPPORTS

A. Support horizontal piping as follows:

PIPE SIZE	MAX/ HANGER SPACING	HANGER DIAMETER
(Steel Pipe)		
1/2 to 1-1/4 inch	7'-0"	3/8"
1-1/2 to 3 inch	10'-0"	3/8"
4 to 6 inch	10'-0"	1/2"
8 to 10 inch	10'-0"	5/8"
12 to 14 inch	10'-0"	3/4"
15 inch and over	10'-0"	7/8"
(Copper Pipe)		
Up to and including 3/4 inch	5'-0"	3/8"
1 and 1-1/4 inch	6-0"	3/8"
1-1/2 and 2 inch	8'-0"	3/8"
2-1/2 inch	9'-0"	1/2"
3 to 5 inch	10'-0"	1/2"
6 inch	10'-0"	5/8"
8 inch	10'-0"	3/4"
(Cast Iron Pipe)		
2 to 3 inch	5'-0"	3/8"
4 to 6 inch	10'-0"	1/2"
8 to 10 inch	10'-0"	5/8"
12 to 14 inch	10'-0"	3/4"
15 inch and over	10'-0"	7/8"
(PVC Pipe)		
1-1/2 to 4 inch	4'-0"	3/8"
6 to 8 inch	4'-0"	1/2"
10 inch and over	4'-0"	5/8"

B. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.

C. Place a hanger within 12 inches of each horizontal elbow and at the vertical horizontal transition.

D. Use hangers with 1-1/2 inch minimum vertical adjustment.

E. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers. Also reference specific requirements for cast iron piping installation in Section 22 10 00, Part 3 Execution.

F. Support vertical piping at base and at every floor. Support vertical cast iron pipe at each floor at hub.

G. For vertical shaft or chase applications where floor slab supported riser clamps cannot be provided to keep the pipe in alignment and to support the weight of the pipe and its contents, ensure to provide suitable fasteners and hardware, braces, unistrut, structural steel members, etc. to accommodate the pipe installation. Coordinate all such work with the project structural engineer to ensure that necessary members and attachment points are provided accordingly to bear the weight of the functioning piping.

H. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

I. Support riser piping independently of connected horizontal piping.

J. Install hangers with nut at base and above hanger; tighten upper nut to hanger after final installation adjustments.

K. Portable pipe hanger systems shall be installed per manufacturer's instructions.

3.3 INSULATED PIPING

A. Clamps: Attach galvanized clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ASME B31.9.

B. Saddles: Install galvanized protection saddles MSS Type 39 where insulation without vapor barrier is indicated. Fill interior voids with segments of insulation that match adjoining pipe insulation. Secure the full contact area of the saddle to the pipe insulation with 1/8" thick coat of mastic.

C. Shields: Install protective shields MSS Type 40 on insulated piping that has vapor barrier. Secure the full contact area of the shield to the pipe insulation with 1/8" thick coat of mastic.

D. Shields shall span an arc of 180 degrees and shall have dimensions not less than the following:

Nominal Pipe Size	Shield Length	Gauge Thickness
1/4 through 3-1/2 inch	12 inch	18
4 inch	12 inch	16
5 through 6 inch	18 inch	16
8 through 14 inch	24 inch	14
16 through 24 inch	24 inch	12

E. Piping 2" and larger provide galvanized sheet metal shields with calcium silicate at hangers/supports.

F. Insert material shall be at least as long as the protective shield.

G. Thermal Hanger Shields: Install where indicated, with insulation of same thickness as piping.

3.4 EQUIPMENT BASES AND SUPPORTS

A. Provide equipment bases of concrete.

B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.

C. Construct support of steel members. Brace and fasten with flanges bolted to structure.

D. Provide rigid anchors for pipes after vibration isolation components are installed.

3.5 FLASHING

A. Provide flexible flashing and metal counter flashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.

B. Flash vent and soil pipes projecting 8 inches minimum above finished roof surface with lead worked one inch minimum into hub, 8 inches minimum clear on sides with 24 x 24 inches sheet size. For pipes through outside walls, turn flanges back into wall and caulk, metal counter flash and seal.

C. Flash floor drains in floors with topping over finished areas with lead, 10 inches clear on sides with minimum 36 x 36 inch sheet size. Fasten flashing to drain clamp device.

D. Seal floor shower mop sink and all other drains watertight to adjacent materials.

E. Provide curbs for mechanical roof installations 8 inches minimum high above roofing surface. Contact architect for all flashing details and roof construction. Seal penetrations watertight.

3.6 SLEEVES

A. Set sleeves in position in formwork. Provide reinforcing around sleeves.

B. Extend sleeves through floors minimum one inch above finished floor level. Caulk sleeves full depth with fire rated thermfiber and 3M caulking and provide floor plate.

C. Where piping penetrates floor, ceiling, or wall, close off space between pipe and adjacent work with UL listed fire stopping insulation and caulk seal air tight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

END OF SECTION 22 05 29

SECTION 22 07 19 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. The Basic Materials and Methods, Section 22 02 00, are included as a part of this Section as though written in full in this document.

1.2 SCOPE

A. Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for owner's use.

B. Furnish and install piping insulation to:
   1. Interior domestic hot water and hot water return piping.
   2. Interior domestic cold water piping.
   3. Exterior domestic cold water piping.
   4.
   5. Condensate drainage piping.
   6. All pipes subject to freezing conditions shall be insulated.

C. Work specified elsewhere.
   1. Painting.
   2. Pipe hangers and supports.

D. For insulation purposes, piping is defined as the complete piping system including supplies and returns, pipes, valves, automatic control valve bodies, fittings, flanges, strainers, thermometer wells, unions, pressure reducing stations, and orifice assemblies.

1.3 RELATED SECTIONS

A. Section 22 05 29 - Hangers and Support for Plumbing Piping and Equipment

B. Section 22 10 00 - Plumbing Piping

1.4 REFERENCES

A. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

B. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2025.

C. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2022a.

D. ASTM C1126 - Standard Specification for Faced or Unfaced Rigid Cellular Phenolic Thermal Insulation; 2024.

E. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation; 2023.

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023c.

G. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 Degrees C; 2024c.

H. ICC (IECC) - International Energy Conservation Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2022).

J. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.5 WARRANTY

A. Warrant the Work specified herein for one year against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials or workmanship.

B. Defects shall include, but not be limited to, the following:
   1. Mildewing.
   2. Peeling, cracking, and blistering.
   3. Condensation on exterior surfaces.

1.6 SUBMITTALS

A. SHOP DRAWINGS: Indicate size, material, and finish. Show locations and installation procedures. Include details of joints, attachments, and clearances.

B. PRODUCT DATA: Submit schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, project variations, and accessories.

1.7 DELIVERY AND STORAGE

A. Deliver undamaged materials in the manufacturer's unopened containers. Containers shall be clearly labeled with the insulation's flame and smoke ratings.

B. Protect insulation against dirt, water and chemical and mechanical damage. Do not install damaged or wet insulation; remove such from project site.

PART 2 - PRODUCTS

2.1 PIPING INSULATION

A. It is the intent of these specifications to secure superior quality workmanship resulting in an absolutely satisfactory installation of insulation from the standpoint of both function and appearance. Particular attention shall be given to valves, fittings, pumps, etc., requiring low temperature insulation to insure full thickness of insulation and proper application of the vapor seal. All flaps of vapor barrier jackets and/or canvas covering must be neatly and securely smoothed and sealed down.

B. The type of insulation and its installation shall be in strict accordance with these specifications for each service, and the application technique shall be as recommended by the manufacturer. All insulation types, together with adhesives and finishes shall be submitted and approved prior to installation.

C. A sample quantity of each type of insulation and each type application shall be installed and approval secured prior to proceeding with the main body of the work. Condensation caused by improper installation of insulation shall be corrected by Installing Contractor. Any damage caused by condensation shall be made good at no cost to the Owner or Architect/Engineer.

D. All insulation shall be listed and labeled to have a composite (insulation, jacket or facing, and adhesive used to adhere the facing or jacket to insulation) flame spread index of not more than 25 and smoke-developed index of not more than 50 when tested in accordance with ASTM E84 or UL 723.

E. All piping insulation shall comply with minimum requirements of International Energy Conservation Code ICC (IECC) and ASHRAE Std 90.1 I-P.

F. Accessories, such as adhesives, mastics and cements shall have the same component ratings as listed above. Additionally, all adhesives and sealants used on the interior of the building (i.e., inside of the weatherproofing system and applied on-site) shall be comprised of low-emitting materials that comply with VOC limits prescribed by SCAQMD 1168.

G. All products or their shipping cartons shall have a label affixed, indicating flame and smoke ratings do not exceed the above requirements.

H. Any existing piping located in an air plenum that is comprised of materials that do not comply with the 25/50 flame and smoke rating per ASTM E84 testing requirements shall be provided with a single layer of high-temperature insulation to establish a noncombustible rating per ASTM E136. Insulation products which are approved for such non-compliant combustible piping materials located air plenums shall be 3M Fire Barrier Plenum Wrap 5A+ or Unifrax FyreWrap 0.5 Plenum. Insulation products for this application shall be installed in strict accordance with the manufacturer’s instructions.

2.2 APPROVED MANUFACTURERS

A. Glass mineral wool materials shall be as manufactured by Knauf Insulation, Johns Manville or Owens-Corning and shall have the same thermal properties, density, fire rating, vapor barrier, etc., as the types specified herein, subject to review by the Engineer. All glass mineral wool insulation shall be UL GREENGUARD Gold certified.

B. Adhesives shall be as manufactured by Childers, Foster, HB Fuller or Armacell, and shall have the same adhesive properties, fire rating, vapor seal, etc., as the types specified herein, subject to review by the Engineer.

C. Armaflex elastomeric cellular thermal insulation by Armacell.

D. Phenolic foam insulation shall be as manufactured by Resolco, Inc. (Insul-Phen) or Polyguard (Poly-phen).

E. Metal jacketing and fitting covers shall be as manufactured by Childers or RPR Products, Inc.

2.3 MATERIALS

A. INTERIOR DOMESTIC WATER PIPE: Provide glass mineral wool pipe insulation in accordance with ASTM C547 with ASJ+ SSL+ jacket.

B. EXTERIOR DOMESTIC WATER PIPE: Provide flexible elastomeric cellular thermal insulation in accordance with ASTM C534/C534M, model "AP Armaflex" with secured aluminum jacketing, or preformed phenolic foam in accordance with ASTM C1126 with secured aluminum jacketing.

C. STORM DRAIN PIPING: Insulate roof and overflow drain bodies and all above slab piping downstream. Insulate chilled water waste lines from drinking fountain to junction with main waste stacks. Insulate branch lines including traps and exposed underside of floor drains receiving cooling coil condensate, same as water piping where exposed to building occupant view. When concealed, insulation may be same as specified for external duct wrap.

D. CONDENSATE DRAINAGE PIPING: Provide flexible elastomeric cellular thermal insulation in accordance with ASTM C534/C534M, model "Armaflex Ultra", fire rated for use in environmental air plenums; insulation not required when piping is exposed on roof.

E. ALUMINUM OR STAINLESS STEEL JACKETING: Utilize strap-on type jacketing, banding, and accessories. Provide pre-formed fitting covers for all elbows and tees.

F. ALL SERVICE JACKETING (ASJ+): Vapor retarder jacket for interior applications shall be composed of an aluminum foil layer, reinforced with glass scrim, bonded to a layer of white kraft paper, interleaving with an outer polymer film leaving no paper exposed, complying with ASTM C1136. Vapor retarder jacket for exterior applications shall be composed of a 3-ply composite membrane consisting of a white 0.5 mil polyester film, 1.0 mil aluminum foil, and one 0.5 mil clear polyester film; complying with ASTM C1136.

PART 3 - EXECUTION

3.1 GENERAL

A. All insulation shall be installed in accordance with the manufacturers' recommendations and printed installation instructions, including high density inserts at all hangers and pipe supports to prevent compression of insulation.

B. All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items required as per manufacturers requirements.

C. Pipes located outdoors or in tunnels shall be insulated same as concealed piping; and in addition shall have a jacket of 0.016 inch thick, smooth aluminum with longitudinal modified Pittsburg Z-Lock seam and 2 inch overlap. Jacketing shall be easily removed and replaced without damage. All butt joints shall be sealed with gray silicone. Galvanized banding is not acceptable.

D. All insulated piping located over driveways shall have an aluminum shield permanently banded over insulation to protect it from damage from car antennas.

E. Provide all piping insulation to comply with the ASHRAE Std 90.1 I-P Minimum Thickness Schedule and as indicated below.
   1. Low temperature surfaces - Minimum Insulation Thickness
      a. Exposed exterior domestic water pipe: 1-1/2 inch
      b. Interior domestic cold water pipe: 1 inch
      c. Condensate drain lines: 3/4 inch
      d. Drains receiving condensate: 1 inch
      e. Concealed piping from roof drains: 1-1/2 inch blanket wrap
      f. Exposed piping from roof drains: 1 inch thick rigid with all service jacket
   2. Domestic Hot Water and Return Piping - Minimum Insulation Thickness
      a. Pipe sizes 1-1/4 inch and smaller with operating temperatures of 140°F or less: 1 inch
      b. Pipe sizes 1-1/2 inch and larger with operating temperatures of 140°F or less: 1-1/2 inch
      c. Pipe sizes 1-1/4 inch and smaller with operating temperatures greater than 140°F: 1-1/2 inch
      d. Pipe sizes 1-1/2 inch and larger with operating temperatures greater than 140°F: 2 inch

3.2 WATER PIPE INSULATION INSTALLATION

A. The insulation shall be applied to clean, dry pipes with all joints firmly butted together. Where piping is interrupted by fittings, flanges, valves or hangers and at intervals not to exceed 25 feet on straight runs, a vapor dam shall be formed between the vapor retarder jacket and the bare pipe. The seal shall be by the applications of vapor retarder mastic to the exposed insulation joint faces, carried continuously down to and along 4 inches of pipe and up to and along 2 inches of jacket.

B. Pipe fittings and valves shall be insulated with pre-molded or shop fabricated glass fiber covers finished with two brush coats of vapor retarder mastic reinforced with glass fabric.

C. All under lap surfaces shall be clean and free of dust, etc. before the SSL is sealed. These laps shall be firmly rubbed to insure a positive seal. A brush coat of vapor retarder shall be applied to all edges of the vapor retarder jacket.

D. At hangers and supports, provide a high density foam insulation insert that extends 2” beyond the shield on each side and a protective shield/saddle to prevent compression/damage. Secure shield/saddle to insulation using mastic. Also reference specific requirements in Section 22 05 29, Part 3 Execution.

3.3 FIRE RATED INSULATION

A. All pipe penetrations through walls and concrete floors shall be fire rated by applying Owens Corning Thermafiber in the space between the concrete and the pipe.

B. The fire rating shall be additionally sealed by using 3M brand model CP 25 or 303 fire barrier caulk and putty.

C. All fire rating material shall be insulated in accordance with manufacturer's printed instructions.

END OF SECTION 22 07 19

SECTION 22 08 00 - COMMISSIONING OF PLUMBING SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract Documents, including General and Supplementary Conditions and Division 01 Specifications, apply to this section.

1.2 RELATED SECTIONS

A. Section 01 91 00 - General Commissioning Requirements

B. Section 23 09 63 - Energy Management and Control System (EMCS)

1.3 SUMMARY

A. The commissioning of the plumbing system and associated controls shall be performed by an impartial technical firm hired by the owner. The commissioning provider shall be certified under one or more of the following certifications:
   1. CxA - Certified Commissioning Authority - ACG
      a. CBCP - Certified Building Commissioning Professional - AEE
      b. CCP - Certified Commissioning Professional - BCA
      c. CPMP - Certified Process Management Professional - ASHRAE
      d. BSC - Building System Commissioning Certification - NEBB

B. The commissioning provider (Commissioning authority) shall be responsible for leading the entire construction team through the commissioning process including, but not limited to, conducting the commissioning kick-off meeting, preparing the commissioning plan, preparing pre-functional checklists, preparing functional test scripts, participation in functional testing and preparation of required documentation and reports.

1.4 RESPONSIBILITIES

A. Contractor: Responsibilities of the Contractor as related to the Commissioning Process include, but are not limited to the following:
   1. Provide all personal, tools, materials, and equipment to facilitate coordination of Commissioning work by Commissioning authority.
   2. Incorporate all commissioning related activites into the project schedule, ensuring that commissioning activies do not delay the project completion.
   3. Notify Dallas ISD and the Commissioning Authority in writting that equipment and systems are ready for functional testing. Perform Equipment startups using authorized manufacturers' representatives.
   4. Provide written documentation to the Commissioning Authority that equipment and systems are fully operational and ready to be functionally performace tested.
   5. Attend Commissioning meetings or other meetings called by Commissioning authority to facilitate the Commissioning Process.
   6. Review Functional Performance Test procedures for feasibility, safety, and impact on warranty, and provide Commissioning authority with written comment on same.
   7. Provide all documentation relating to manufacturer’s recommended performance testing of equipment and systems.

8. Provide Operations & Maintenance data to Commissioning authority for preparation of checklists and training manuals.
9. Provide As-built drawings and documentation to facilitate Testing.
10. Assure and facilitate participation and cooperation of Sub Contractors and equipment suppliers as required for the Commissioning Process.
11. Certify to Commissioning authority that installation work listed in Pre-Functional Checklists has been completed.
12. Install systems and equipment in strict conformance with project specifications, manufacturer's recommended installation procedures, and Pre-Functional Checklists.
13. Provide data concerning performance, installation, and start-up of systems.
14. Provide copy of manufacturers filled-out start-up forms for equipment and systems.
15. Ensure systems have been started and fully checked for proper operation prior to arranging for Testing with Commissioning authority. Prepare and submit to Commissioning authority **written** certification that each piece of equipment and/or system has been started according to manufacturer's recommended procedure, and that system has been tested for compliance with operational requirements.
    a. Contractor shall carry out manufacturer's recommended start-up and testing procedures, regardless of whether or not they are specifically listed in Pre-Functional Checklists.
    b. Contractor is not relieved of obligation for systems/equipment demonstration where performance testing is required by specifications, but a Functional Performance Test is not specifically designated by Commissioning authority.
16. Coordinate with Commissioning authority to determine mutually acceptable date of Functional Performance Tests.
17. Provide qualified personnel to assist and participate in Commissioning.
18. Provide test instruments and communications devices, as prescribed by Commissioning authority, required for carrying out Testing of systems.
19. Proprietary test equipment required by the manufacturer, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate its use, and assist in the commissioning process. Proprietary test equipment shall become the property of the Owner upon completion of commissioning.
20. Ensure deficiencies found in the Commissioning Issues Log are corrected within the time schedule shown in the Commissioning Plan.
21. Provide Commissioning authority with all submittals, start-up instructions manuals, operating parameters, and other pertinent information related to Commissioning Process. This information shall be routed through Architect.
22. Provide commissioning authority with a certificate of readiness to show systems are ready to schedule functional testing.
23. Prepare and submit to Commissioning authority proposed Training Program outline for each system.
24. Coordinate and provide training of Owner's personnel.
25. Prepare Operation & Maintenance Manuals and As-Built drawings in accordance with specifications; submit copy to Commissioning authority in addition to other contractually required submissions. Revise and resubmit manuals in accordance with Design Professionals and Commissioning authority comments.
26. Commissioning requires participation of this Division Subcontractors to ensure that systems are operating in manner consistent with Contract Documents. All costs associated with the participation of Contractor, Sub-Contractors, Design Professionals, and Equipment Vendors in the Commissioning Process shall be included as part of the Construction Contract.

B. Subcontractors and vendors shall prepare and submit to Commissioning authority proposed Startup procedures to demonstrate proper installation of systems, according to these specifications and checklists prepared by Commissioning authority

1.5 COMMISSIONING PLAN

A. Commissioning Process tasks and activities:
   1. Commissioning kick-off meeting: Conducted by commissioning authority and attended by construction team and design team.
   2. Pre-functional checklists: Prepared by the commissioning authority and filled out by subcontractors performing the work that is applicable.
   3. Site visits to review installation of applicable systems and progress of checklist documentation performed and reported by commissioning authority.
   4. Functional testing: Commissioning authority shall conduct functional testing with assistance of applicable subcontractors and document successful results as well as deficiencies (issues). Functional performance testing shall demonstrate the installation and operation of components, systems, and system-to-system interfacing in accordance with plans and specifications. Testing shall include all modes and sequence of operation, including under full-load, part-load and emergency conditions (including all alarms). Controls system shall be tested to document that control devices, components, equipment and systems are calibrated and adjusted and operate in accordance with the plans and specifications. Sequences shall be functionally tested to document they operate in accordance with plans and specifications.
   5. Preliminary commissioning report: Commissioning authority shall issue a preliminary commissioning report to the owner that has results of the first round of functional testing including deficiencies discovered.
   6. Systems manual: Commissioning authority shall compile the systems manual using submittal data provided by the general contractor and applicable subcontractors.
   7. Final commissioning report: Commissioning authority shall issue final commissioning report documenting the entire process and final results of functional testing. Report shall include final testing and balancing report.

B. Equipment to be tested
   1. Energy Management and Control System interface with applicable plumbing system equipment.
   2. Service water heating systems (100%).
   3. Service water circulation equipment (100%).
   4. Domestic water booster pumps (100%).

C. Testing functions and conditions
   1. Verify shutdown of systems when scheduled.
   2. Calibration of sensors
   3. Confirm functionality of all specified sequences of operations.
   4. Verify the functionality of all alarms.

D. Performance criteria
   1. Water temperatures shall be within tolerances specified in the contract documents.
   2. Water heating system “recovery” rates shall be within specified time frame.
   3. Booster pump shall maintain system pressure within specified tolerance.

PART 2 - PRODUCTS

2.1 NO PRODUCTS SUPPLIED

PART 3 - EXECUTION

3.1 GENERAL

A. This Division has startup responsibilities and are required to complete sub-systems so COMPLETE SYSTEMS are fully functional. Insuring they meet design requirements of Contract Documents. Commissioning procedures and testing do not relieve or lessen this responsibility or shift this responsibility, in whole or in part, to Commissioning Agent or Owner.

B. Coordinate with other Sub-Contractors and equipment vendors to set aside adequate time to address Pre-Functional Checklists, Functional Performance Tests, Operations & Maintenance Manual creation, Owner Training, and associated coordination meetings.

C. Commissioning authority will also conduct site inspections at critical times and issue Cx Field Reports with observations on installation deficiencies so that they may be issued by Architect as deemed appropriate.

3.2 WORK PRIOR TO COMMISSIONING

A. Complete all phases of the work so the systems can be started, adjusted, balanced, tested, and otherwise tested.

B. See pertinent specification sections in this Division, which outline responsibilities for start-up of equipment with obligations to complete systems, including all sub-systems so that they are fully functional.

C. Assist commissioning authority with all information pertaining to actual equipment and installation as required complete the full commissioning scope.

D. Contractor shall prepare startup procedures to demonstrate compliance with pre-functional checklists, and coordinate scheduling for completion of these checklists.

E. A minimum of 7 days prior to date of system startup, submit to Commissioning authority for review, detailed description of equipment start-up procedures which contractor proposes to perform to demonstrate conformance of systems to specifications and Checklists.

3.3 PARTICIPATION IN COMMISSIONING

A. Attend meetings related to the Commissioning Process; arrange for attendance by personnel and vendors directly involved in the project, prior to testing of their systems.

B. Provide skilled technicians to startup and test all systems, and place systems in complete and fully functioning service in accordance with Contract Documents.

C. Provide skilled technicians, experienced and familiar with systems being commissioned, to assist Commissioning authority in commissioning process.

3.4 WORK TO RESOLVE DEFICIENCIES

A. Complete corrective work in a timely manner to allow expeditious completion of Commissioning Process. If deadlines pass without resolution of identified problems, Owner reserves the right to obtain supplementary services and/or equipment to resolve the problem. Costs thus incurred will be Contractor's responsibility.

3.5 PRE-FUNCTIONAL CHECKLISTS (PFC)

A. Contractor shall complete Pre-Functional Checklists to validate compliance with Contract Documents installation and start-up requirements, for this Division's systems.

B. Refer to commissioning plan for detailed list of equipment to be commissioned.

3.6 FUNCTIONAL PERFORMANCE TESTING (FPT)

A. Contractor, in cooperation with Commissioning Agent, shall conduct Functional Performance Testing to validate compliance with Contract Documents.

B. Refer to commissioning plan for detailed list of equipment to be commissioned.

C. Provide commissioning authority with a certificate of readiness to show systems are ready to schedule functional testing.

D. Assist Commissioning authority in Functional Testing by removing equipment covers, opening access panels, etc. Furnish ladders, flashlights, meters, gauges, or other inspection equipment as necessary.

E. Sampling
   1. Multiple identical pieces of non-life-safety or otherwise non-critical equipment may be functionally tested using a sampling strategy.
   2. Significant application differences and significant sequence of operation differences in otherwise identical equipment invalidates their common identity. A small size or capacity difference, alone, does not constitute a difference. It is noted that no sampling by Subs is allowed in pre-functional checklist execution.
   3. A common sampling strategy is the "xx% Sampling - yy% Failure Rule", defined by the following example.
      a. xx = the percent of the group of identical equipment to be included in each sample.
      b. yy = the percent of the sample that if failing, will require another sample to be tested.
      c. The example below describes a 20% Sampling - 10% Failure Rule.
      d. Randomly test at least 20% (xx) of each group of identical equipment. In no case test less than three units in each group. This 20%, or three, constitute the "first sample."
      e. If 10% (yy) of the units in the first sample fail the functional tests, test another 20% of the group (the second sample).
      f. If 10% of the units in the second sample fail, test all remaining units in the whole group.
      g. If at any point, frequent failures are occurring and testing is becoming more troubleshooting than verification, the CxA may stop the testing and require the responsible Sub to perform and document a checkout of the remaining units, prior to continuing with functionally testing the remaining units.

F. Re-Testing And Failure To Remedy Deficiencies

1. Despite Contractor's best efforts to ensure systems are problem-free, it is expected that some deficiencies will be found during initial inspection of Pre-functional Checklist, and during initial Functional Testing; such deficiencies are expected to be minimal.
2. It is Contractor's responsibility to remedy identified deficiencies, both in Pre-functional Checklist and in Functional Testing phases of work, in a timely and thorough manner.
3. It is Contractor's responsibility to ensure that all deficiencies are corrected prior to requesting a re-inspection or re-test of systems and equipment. Do not request re-inspection or re-test until deficiencies are corrected.
    a. At his discretion, CxA may agree to re-testing systems or equipment where deficiencies remain which are beyond Contractor's control to resolve expeditiously.
    b. Typically such re-testing of incomplete systems and equipment will take place only if remaining deficiencies are minor in scope and nature, and are of such nature that they cannot be resolved in a timely manner (such as those due to difficulties in obtaining parts, or where Owner has requested a change that has delayed work, etc.)
4. CxA will carry out a second re-inspection or re-test of systems and equipment subsequent to receiving Contractor's request.
    a. If CxA finds deficiencies identified in initial inspection or test have not been remedied (with exception of un-resolvable deficiencies in 3.b. above), and such remaining deficiencies are significant enough to require additional inspection or re-testing, Contractor will be back-charged for CxA's expenses, and time at a rate of $150.00 per hour and $100.00 expenses, for a third and any subsequent re-inspections and re-tests.

G. Deferred Testing
1. "Seasonal Commissioning" pertains to testing during peak heating or cooling seasons when HVAC equipment is operating at full-load or heavy-load conditions. Initial commissioning will be done as soon as contract work is completed, regardless of season. Seasonal Commissioning under full- or heavy-load conditions other than the current season will be handled at later time by GC and CxA.
2. If adequate load may be artificially placed upon heating or cooling equipment, CxA, at his discretion, may perform functional testing during non-peak load periods.
3. GC is to provide services of personnel and participate in seasonal testing process in the same manner as he would in non-seasonal testing.
4. Until off-season commissioning can be accomplished, Owner may retain an amount from GC's payment sufficient to cover the cost of off-season testing.
5. Unforeseen Deferred Tests: If any check or test cannot be completed due to building structure, required occupancy condition, or other reason, execution of checklists and functional testing may be delayed upon approval of Owner. Tests shall be conducted in same manner as seasonal tests, as soon as possible. Services of required parties will be negotiated. Make final adjustments to Operation and Maintenance Manuals and record drawings due to unforeseen deferred tests.
6. GC is to provide services of personnel and participate in deferred testing in the same manner as he would for normal commissioning.

3.7 TRAINING

A. The following requirements are in addition to Operations & Maintenance requirements specified elsewhere in this specifications manual.

B. Contractor shall be responsible for training coordination and scheduling, and ultimately to ensure that training is completed.

C. The training agenda (plan) shall include, at a minimum, the following elements:
   1. Purpose of equipment.
   2. Principle of how the equipment works.
   3. Important parts and assemblies.
   4. How the equipment achieves its purpose and necessary operating conditions.
   5. Most likely failure modes, causes and corrections.
   6. On site demonstration.

D. Commissioning authority shall be responsible for overseeing and approving content and adequacy of training of Owner personnel for all installed systems. Provide Commissioning authority with training plan two weeks before planned training.

3.8 OPERATIONS & MAINTENANCE MANUALS

A. The following requirements are in addition to Operations & Maintenance requirements specified elsewhere in this specifications manual.

B. Sub-Contractor shall compile and prepare documentation for equipment and systems specified in this Division, and shall deliver documentation to Contractor for inclusion in Operation & Maintenance Manuals, in accordance with requirements of Division 01, prior to training Owner personnel.

C. Provide Commissioning authority with a single, electronic copy of Operation & Maintenance Manuals for review. Commissioning authority copy of O&M manuals shall be submitted through Architect.

D. Operation and maintenance manuals shall include, service agency contact information, maintenance requirements, controls system settings and a narrative of how each system is intended to operate, including set points.

3.9 DOCUMENTATION

A. Commissioning authority shall provide documentation of process as follows:
   1. Preliminary commissioning report including test procedures, results of testing, itemization of deficiencies, deferred tests and climatic conditions required for performance of deferred tests. Preliminary commissioning report shall be issued to owner to demonstrate the first pass of testing has occurred and to demonstrate compliance with applicable codes.
   2. Final commissioning report shall include the final test and balance report, final results of functional testing, disposition of deficiencies discovered during testing, including the details of corrective measures used and functional testing procedures used for repeatability of testing in the future.

END OF SECTION 22 08 00

SECTION 22 10 00 - PLUMBING PIPING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. The Basic Materials and Methods, Section 22 02 00, are included as a part of this Section as though written in full in this document.

1.2 SCOPE

A. The scope of the work shall include the furnishing and complete installation of the piping covered by this Section, with all appurtenances, ready for the Owner's use.

B. Include the following work in addition to items normally part of this Section:
   1. Pipe and pipe fittings:
      a. Sanitary drainage piping system.
      b. Storm drainage piping system.
      c. Acid waste drainage piping system.
      d. Domestic water piping system.
   2. Adapters, Transitions, Unions, Couplings, Flanges, Connectors
   3. Valves
   4. Excavation, Bedding, and Backfill

1.3 RELATED WORK

A. Section 22 05 29 - Hangers and Support for Plumbing Piping and Equipment

B. Section 22 07 19 - Plumbing Piping Insulation

C. Section 22 30 00 - Plumbing Equipment

D. Section 22 40 00 - Plumbing Fixtures

1.4 REFERENCES

A. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2020.

B. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 Through NPS 24 Metric/Inch Standard; 2025.

C. ASME B16.14 - Ferrous Pipe Plugs, Bushings, and Locknuts With Pipe Threads; Current Edition.

D. ASME B16.15 - Cast Copper Alloy Threaded Fittings Classes 125 and 250; 2018.

E. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings: DWV; 2021.

F. ASME B16.24 - Cast Copper Alloy Pipe Flanges, Flanged Fittings, and Valves: Classes 150, 300, 600, 900, 1500, and 2500; 2021.

G. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder-Joint Drainage Fittings—DWV; 2022.

H. ASME B16.39 - Malleable Iron Threaded Pipe Unions: Classes 150, 250, and 300; 2025.

I. ASME B16.50 - Wrought Copper and Copper Alloy Braze-Joint Pressure Fittings; 2013.

J. ASME BPVC - Boiler and Pressure Vessel Code; 2025.

K. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators; 2025.

L. ASSE 1079 - Performance Requirements for Dielectric Pipe Unions; 2012.

M. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings; 2004 (Reapproved 2019).

N. ASTM A582/A582M - Standard Specification for Free-Machining Stainless Steel Bars; 2022.

O. ASTM A733 - Standard Specification for Welded and Seamless Carbon Steel and Austenitic Stainless Steel Pipe Nipples; 2016 (Reapproved 2022).

P. ASTM A865/A865M - Standard Specification for Threaded Couplings, Steel, Black or Zinc-Coated (Galvanized) Welded or Seamless, for Use in Steel Pipe Joints; 2023.

Q. ASTM A888 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2020.

R. ASTM B32 - Standard Specification for Solder Metal; 2020.

S. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings; 2017.

T. ASTM B306 - Standard Specification for Copper Drainage Tube (DWV); 2020.

U. ASTM B813 - Standard Specification for Water Flushable Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2024.

V. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2023.

W. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2020a.

X. ASTM C1173 - Standard Specification for Flexible Transition Couplings for Underground Piping Systems; 2018.

Y. ASTM C1460 - Standard Specification for Shielded Transition Couplings for Use With Dissimilar DWV Pipe and Fittings Above Ground; 2017.

Z. ASTM C1540 - Standard Specification for Heavy-Duty Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings; 2020.

AA. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications; 2025.

BB. ASTM D2774 - Standard Practice for Underground Installation of Thermoplastic Pressure Piping; 2021a.

CC. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets; 2020 (Reapproved 2024).

DD. ASTM D5926 - Standard Specification for Poly (Vinyl Chloride) (PVC) Gaskets for Drain, Waste, and Vent (DWV), Sewer, Sanitary, and Storm Plumbing Systems; 2015.

EE. AWWA C209 - Tape Coatings for Steel Water Pipe and Fittings; 2019.

FF. AWWA C219 - Bolted Sleeve-Type Couplings for Plain-End Pipe; 2023.

GG. AWWA C651 - Disinfecting Water Mains; 2023.

HH. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications; 2017 (Revised 2018).

II. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2012 (Revised 2018).

1.5 QUALITY ASSURANCE

A. Manufacturer: For each product specified, provide components by the same manufacturer throughout.

B. Valves: Manufacturer's name, size, and pressure rating shall be cast or marked on valve body or handle.

C. Piping shall be labeled along its entire length indicating size, class, material specification, manufacturer’s name and country of origin.

D. Foreign pipe, fittings or valves are unacceptable.

E. All cast iron soil pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and shall be listed by NSF International.

F. Welding Materials and Procedures: Conform to ASME BPVC and applicable state labor regulations.

G. Welders Certification: In accordance with ASME BPVC-IX.

1.6 SUBMITTALS

A. Submit under provisions of Division One.

B. Submit product data and video inspection report under provisions of Division One.

C. Include pipe materials, pipe fittings, valves, and accessories. Provide manufacturer's catalog information, product certifications, and country of origin. Indicate valve data and ratings.

D. Submit dimensioned detailed drawings and material specifications for pipe isolation and protection systems being provided for void form/carton form/void box installations.

1.7 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division One.

B. Record actual locations of valves.

C. Include written report and digital video record of waste piping inspection.

1.8 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division One.

B. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.9 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with a minimum of 5 years documented experience and must be a domestic manufacturer.

B. Installer: Company specializing in performing the work of this section with a minimum of 5 years documented experience.

1.10 DELIVERY, STORAGE, AND HANDLING

A. DELIVERY: Deliver clearly labeled piping and valves to; and store, protect and handle products on site in accordance with the provisions of Division One.

B. TIMING AND COORDINATION: Arrange for delivery of materials to allow for minimum storage time at the project site. Coordinate with the scheduled time of installation.

C. ACCEPTANCE: Accept product on site in original factory packaging. Receive valves on site in shipping containers with labeling in place. Inspect for damage. Damaged valves shall not be acceptable.

D. STORAGE: Store materials in a clean, dry location, protected from weather and damage.

E. Provide temporary protective coating on cast iron and steel valves.

F. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

G. Protect installed piping systems from entry of foreign materials by providing temporary covers, as completing sections of the work, and isolating parts of completed systems. Tape will not be allowed as an acceptable end cover.

1.11 EXTRA MATERIALS

A. Furnish under provisions of Division One.

1.12 REGULATORY REQUIREMENTS

A. Perform work in accordance with plumbing and building codes having jurisdiction.

B. PVC pipe, fittings, or similar un-rated material shall not be installed in a return air plenum unless the entire length of all such piping is encased within a minimum two (2) hour fire rated enclosure.

C. Provide a water pressure regulating valve assembly at the service entry where incoming water supply pressure is greater than 70 psi.

PART 2 - PRODUCTS

2.1 SANITARY SOIL, WASTE AND VENT PIPING, WITHIN BUILDING, NOT BURIED

A. Cast Iron Pipe: CISPI 301 or ASTM A888, hubless.
   1. Fittings: Cast iron, CISPI 301 or ASTM A888 drainage pattern.
   2. Acceptable manufacturers (all pipe and fittings shall be from a single manufacturer):
      a. Tyler Pipe
      b. Charlotte Pipe
      c. AB&I Foundry
   3. Joints: No hub, ASTM C564 neoprene gaskets with ASTM C1540 heavy duty wide bodied stainless steel clamp and solid shield assembly constructed of type 300 series stainless steel. Couplings shall have four clamps for pipe sizes up to and including 4” and shall have six clamps for pipe sizes larger than 4”. Clamp assemblies shall conform to FM 1680 Class 1 where required by the administrative authority. Torque all clamps per manufacturer’s recommendations.

B. Copper Tubing: ASTM B306, DWV, for sizes 2" and smaller.
   1. Fittings: ASME B16.23 cast copper alloy solder joint drainage fittings (DWV), or ASME B16.29, wrought copper and wrought copper alloy solder joint drainage fittings (DWV).
   2. Joints between copper pipe and fittings shall be made in accordance with ASTM B828 using ASTM B32 Alloy Grade Sn 50 solder (50-50 tin-lead).
   3. Joints between copper and cast iron pipe shall be made by way of copper soldered to a brass ferrule and the ferrule joined to the cast iron hub by a compression or caulked joint.

C. PVC Pipe: ASTM D1785 / ASTM D2665 schedule 40 solid wall.
   1. Fittings: PVC, ASTM D3311 / ASTM D2665 drainage pattern, with bell and spigot ends. Furnished by the same manufacturer as pipe or approved equal.
   2. Joints: solvent weld with ASTM D2564 solvent cement, installed per the requirements of ASTM D2855.

2.2 STORM DRAINAGE PIPING, WITHIN BUILDING, NOT BURIED

A. Cast Iron Pipe: CISPI 310 or ASTM A888, hubless.
   1. Fittings: Cast iron, CISPI 310 or ASTM A888 drainage pattern.
   2. Acceptable manufacturers (all pipe and fittings shall be from a single manufacturer):
      a. Tyler Pipe

b. Charlotte Pipe
c. AB&I Foundry

3. Joints: No hub, ASTM C564 neoprene gaskets with ASTM C1540 wide bodied stainless steel clamp and solid shield assembly constructed of type 300 series stainless steel. Couplings shall have four clamps for pipe sizes up to and including 4” and shall have six clamps for pipe sizes larger than 4”. Clamp assemblies shall conform to FM 1680 Class 1 where required by the administrative authority. Torque all clamps per manufacturer’s recommendations.

2.3 DOMESTIC WATER PIPING, WITHIN BUILDING, NOT BURIED

A. Copper Tubing: ASTM B88, Type L, hard drawn.
1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper alloy solder joint pressure fittings.

B. Joining:
1. Joints between copper pipe and fittings shall be made in accordance with ASTM B813 and ASTM B828.
2. Provide solid string/wire hard solder. Cored solder is not allowed.
3. Solder shall be lead-free:
a. 95.5% tin, 4% copper, 0.5% silver for joints 1-1/2" and smaller.
b. 15% silver, 80% copper, 5% phosphorous "SILFOS 15" for joints 2" and larger.
4. Flux shall be non-corrosive, lead-free paste.

2.4 ADAPTERS, TRANSITIONS, UNIONS, COUPLINGS, FLANGES, CONNECTORS

A. (Non-Acid Waste) Drainage Applications:
1. Provide approved listed adapter and transition fittings appropriate to the specific pipe transition and in accordance with code requirements.
2. For dissimilar piping above ground, provide stainless steel shielded, molded elastomeric couplings and adapters meeting ASTM C564 and ASTM C1460. Applies to installations including cast iron to PVC transitions immediately adjacent to the building floor where piping below is buried.
3. For dissimilar underground piping not below building slab, provide shear resistant .012” thick 300 series stainless steel shielded, PVC gasketed ible couplings and adapters meeting ASTM D5926 and ASTM C1173. For direct-bury applications, provide AWWA C209 cold-applied, integrated primer type, elastomeric adhesive, laminate polymeric tape coating, minimum 35 mil nominal thickness, in accordance with manufacturer’s installation guidelines, to completely wrap the shield, banding, and screws. Chase Construction Products Tapecoat H35 or approved equivalent.
4. Acceptable manufacturers:
a. Anaco-Husky/Cremco
b. Mission Rubber Company LLC
c. Fernco, Inc.
d. Fernco, Inc. Strong Back RC 1000 Series (underground piping, not below building slab; or readily accessible underground piping transitions in backwater valve pits, etc.)
5. Adapters, couplings, bushings for copper DWV pipe shall be cast bronze or wrought copper, ASME B16.23 / ASME B16.29.

B. Domestic Water Applications:

1. Provide joints between various materials with approved adapter and transition fittings appropriate to the specific pipe transition and in accordance with code requirements and the manufacturer's instructions.
2. For copper tube and pipe: adapters, bushings, plugs, caps, and couplings shall be wrought copper or cast bronze; flanges (minimum class 150) and unions shall be cast bronze. Provide with solder or threaded connections as necessary and as produced to applicable standards ASME B16.15, ASME B16.18, ASME B16.22, ASME B16.24, ASME B16.50 ASME B16.50, ASME B1.20.1.All such appurtenances shall be for use in above ground potable water systems.Only soldered fittings are allowed.
    a. Provide a cast brass adapter when connecting copper pipe to screwed brass pipe.
    b. All such appurtenances shall be for use in above ground potable water systems.
3. Above slab transitions for water service entries:
    a. 100% fusion bonded epoxy coated ASTM A536 cast ductile iron construction coupling with acrylonitrile butadiene rubber (NBR) gaskets and EPDM insulating boot for water service. 5/8 inch high strength stainless steel bolts and nuts. Coupling shall meet AWWA C219. Romac Industries, Inc. IC501 or pre-approved equivalent.
    b. 100% fusion bonded 14 mil epoxy coated coupling with ASTM A536 cast ductile iron rings. Complete with acrylonitrile butadiene rubber (NBR) gaskets and type 304 stainless steel bridge, spacers, nuts, and bolts. Coupling shall meet AWWA C219, NSF 61, and NSF 372. Krausz USA Hymax Grip Coupling Restraint or pre-approved equivalent.
4. Dielectric connections: Provide at connections of dissimilar metals.
    a. For pipe sizes 2 inch and smaller, provide lead-free dielectric unions, rated to 180 F at 250 psi and compliant to ASSE 1079.
    b. For pipe sizes larger than 2 inches, provide lead-free dielectric flanged pipe fittings, rated to 180 F at 175 psi and meeting ASME B16.1.
    c. For grooved copper joining systems, provide grooved end dielectric transition fitting from system manufacturer, with virgin polypropylene internal lining, meeting NSF 61.

C. General:
1. Unions for ferrous pipe shall be ASME B16.39 galvanized malleable iron, threaded, minimum pressure class 150.
2. Plugs and bushings for ferrous pipe shall be ASME B16.14 galvanized malleable iron, threaded.
3. Nipples for ferrous pipe shall be schedule 40, galvanized, ASTM A53/A53M welded steel pipe nipples, threaded, meeting ASTM A733.
4. Couplings for ferrous pipe shall be galvanized steel, threaded, manufactured in accordance with ASTM A865/A865M.
5. Flanges for ferrous pipe shall be galvanized forged steel construction, either socket weld or slip-on weld type, minimum pressure class 150, manufactured to ASME B16.5.
6. Bolts, nuts, and gaskets for flanged connections shall be appropriate to the pipe material, fluid type, temperature, and pressure. 1/16" thick pre-formed neoprene, typical.
7. Provide flexible stainless steel connectors at pumps and other such equipment, in accordance with manufacturer's recommendations. Connectors shall have corrugated hose and braided 300 series stainless steel jacketing. Carbon steel flanged or grooved ends as appropriate. NSF 372 lead-free for all potable water applications. Metraflex Company or pre-approved equivalent.

2.5 BALL VALVES

A. All bronze cast construction two-piece 600 psi body, blow-out proof stem, Teflon seated, lead-free, with stainless steel trim (including ball, stem, and valve handle). Threaded connections. Certified lead-free to NSF 61 / NSF 372 and suited to 180 degrees F.

B. Basis of design (bronze valves):
   1. NIBCO T-585-66-LF (full port) for all sizes up through 2”.
   2. NIBCO T-580-66-LF (conventional port) for sizes 2-1/2” and 3”.

C. Acceptable alternate manufacturers:
   1. Apollo 77 CLF-A series (full port) for all sizes up through 2”.
   2. Milwaukee UPBA-400S (full port) for all sizes up through 2”.
   3. Apollo 77 CLF-A series (full port) for size 2-1/2” and Apollo 70LF-140 series (standard port) for 3”.
   4. Milwaukee UPBA-100S (standard port) for sizes 2-1/2” and 3”.

D. Applies to domestic water system installations.

E. Provide valves complete with extended lever handles as required to accommodate insulation and full valve operation.

F. Provide valves complete with memory stop kit where used for balancing applications.

2.6 CHECK VALVES (BRONZE)

A. ASTM B62 / ASTM B584 bronze body and disc, minimum 200 psi (cold working pressure) Y-pattern horizontal swing type check valve with removable bronze bonnet, Type 300 series stainless steel nuts and hinge pin, and Buna-Ndisc seat. Threaded connections. Certified lead-free to NSF 61 / NSF 372 and suited to 180 degrees F.

B. ASTM A126 cast iron bodied, (minimum) class 125 globe style spring loaded (silent) check valve with ASTM B584 bronze disc and seat. Flanged connections. Certified lead-free toNSF 61 / NSF 372 and suited to 200 degrees F.

C. Basis of design:
   1. NIBCO T-413-Y-LF (Y-pattern swing type) for sizes up through 2”.
   2. NIBCO F-910-B-LF (globe style spring loaded type) for sizes 2-1/2” and larger.

D. Acceptable alternate manufacturers:
   1. Apollo (for sizes up through 2”)

E. Applies to domestic water system installations including associated pump discharge lines. Valves shall be suited for installation in both horizontal lines and vertical lines with upward flow, in accordance with manufacturer’s recommendations.

2.7 BALANCING VALVES

A. Self-contained, fully automatic thermally actuated balancing valve shall continuously adjust flow to maintain the desired domestic hot water temperature within the branch line, regardless of system operating pressure. Valve shall modulate between open and closed position within a 10 degrees F range. Valve body and all internal components shall be constructed of stainless steel with major components constructed of Type 303 stainless. Rated for 200 psi maximum working pressure and no less than 250 degrees F maximum working temperature. Lead-free NSF 372 and NSF 61 compliant. Threaded connections.

B. Basis of design:
   1. ThermOmegaTech Circuit Solver, sizes 1/2" through 2”. Provide a union and ball type shutoff valve on both sides of the balancing valve.
   2. ThermOmegaTech Circuit Solver with integrated union (CSU) assembly, sizes 1/2" and 3/4". Balancing valve assembly shall come complete with union body and ball type shutoff valves on both sides.

C. Applies to circulated domestic hot water system installations including multi-branch parallel piping circuits and single-loop piping circuits.
   1. Provide balancing valve at end of each domestic hot water supply line (after last fixture served) just prior to the hot water return line, as indicated on Drawings and in accordance with manufacturer’s installation recommendations.
   2. Provide a pipe tee or elbow with bushing as appropriate, 3/4" threaded thermowell, and bi-metal adjustable angle 3 inch dial thermometer upstream of each balancing valve. Thermowell stem length and thermometer temperature probe length to be suited for pipe size, insulation thickness, and to ensure clearance for maintenance access and easy viewing of thermometer. Trerice bimetal/sensor, threaded-stepped shank thermowell (style 76) of lead-free brass (PBF) material. Trerice Model B836 thermometer with 300 stainless steel case and stem, hermetically sealed, double strength glass windowed, aluminum white-faced dial, complete with external reset and 0 to 200 degrees F range. Thermowell and thermometer face to be oriented upright for readability.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General requirements for piping:
   1. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
   2. Remove any scale, oil and dirt, on inside and outside, before assembly.
   3. Prepare piping connections to equipment with shutoff valves and with flanges or unions.
      a. Provide flanges instead of unions at all connections 2-1/2" and larger.
      b. In no case shall connections to water heaters or other equipment be smaller than the manufacturer's connection sizes at the water heater or equipment.
   4. Confirm pipe placement, depth/elevation, and flow lines prior to any installation.
   5. Above ground domestic water piping shall be installed level and plumb.
   6. At each water service pipe penetration through a foundation wall provide a sleeve with water stop and mechanical sleeve seal for a watertight installation. Reference the Article above for addtional information.
   7. Ensure that piping adjacent to equipment is installed to allow for service and maintenance.

B. General requirements for valves:
   1. Install valves with stems upright or horizontal, not inverted.
   2. Valves shall be line-sized unless specifically noted otherwise.
   3. Provide clearance for installation of insulation and access to valves and operable fittings. Valves installed beyond reasonable reach shall be provided with a chain operator.
   4. Provide access doors where valves and operable fittings are not otherwise accessible. Access doors shall be of approved types set in locations pre-approved by submittal to the Architect.
   5. Gate valves installed buried shall be covered with an adjustable cast iron roadway box extended to grade. Cover shall be cast iron with 'water' cast on top of cover and shall be set flush to finished paving or 2" above finished earthen grade. Box shall be supported from undisturbed soil or concrete base and shall not introduce any stress to piping under all traffic conditions.

C. Install all materials in accordance with the manufacturer's published instructions.

D. All exposed sewer and water pipe in toilet rooms or other finished areas of the building shall be chrome plated.

E. Provide non-conducting dielectric connections wherever joining dissimilar metals.

F. Route piping in an orderly manner, parallel and perpendicular to building column grid lines, unless indicated otherwise on drawings, and maintain gradients.

G. Install piping to conserve building space and not conflict with other trades or interfere with intended use of space.

H. Group piping whenever practical at common elevations.

I. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

J. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

K. Provide encasement for and support for utility meters in accordance with the requirements of utility companies.

L. Prepare pipe, fittings, supports, and accessories not pre-finished, ready for finish painting.

M. Maintain uniformity in the installation of piping materials and joining methods. Do not mix material types.

N. Where connecting new underground sanitary, storm, or vent piping to existing piping of dissimilar material, provide suitable mechanical transition fittings complete with corrosion protection for metallic elements. Chase Construction Products Tapecoat H35 or approved equivalent and a final coat of coal tar to completely cover the transition.

O. Solder joints shall be wiped clean at each joint, remove excess metal while molten and flux residue when cooled.

P. Waste nipple from wall to tapped tee shall be schedule 40 threaded galvanized steel pipe or brass or copper with threaded adapter.

Q. General requirements for cast iron piping installation:
   1. Install all pipe and fittings in accordance with published recommendations from the manufacturer and the Cast Iron Soil Pipe Institute (CISPI). Specific items referenced below are not intended as a substitute for the complete and latest recommendations.
   2. Install bell and spigot type pipe with bell end upstream.
   3. Above ground horizontal pipe (suspended) shall:
      a. Be supported at no less than at every joint, and within 18” of the hub or coupling.
      b. Be maintained in alignment. Sagging or grade reversal shall be unacceptable.
      c. Be supported at terminal ends of all runs or branches and at each change of direction or alignment.
      d. Have all closet bends, traps, trap arms, and similar branches firmly secured.
      e. Be braced to prevent movement or joint separation.
      f. Be provided with suitable sway bracing (such as clamps, rods, and hardware) where pipe and fittings are suspended in excess of 18” by means of non-rigid hangers.
   4. Above ground vertical pipe shall:
      a. Be secured at each stack base.
      b. Be secured at each floor and riser clamps shall be provided on no greater than 15’-0” intervals.
      c. Be adequately supported to keep the system (pipe and contents) in alignment.
   5. Provide seismic restraints in seismically active areas, whether specifically required by the prevailing code or not.

R. PVC pipe, fittings, or similar un-rated material shall not be installed in a return air plenum unless the entire length of all such piping is encased within a minimum two (2) hour fire rated enclosure.

S. Installations of buried thermoplastic piping systems shall be in strict conformity with the manufacturer’s published instructions and the requirements of ASTM D2321(gravity pipe) and ASTM D2774 (pressure pipe).

T. Installation of thermoplastic piping systems which are not buried shall be in accordance with the manufacturer’s recommendations. The specific items indicated below are not intended as a substitute for the complete and latest manufacturer’s recommendations.

1. Hangers and supports shall not compress, distort, cut, or abrade the piping. Nor shall they force the pipe and fittings into position.
2. Piping shall be supported at intervals sufficiently close to maintain pipe alignment and to prevent any sagging or grade reversal. System maximum operating temperature will determine support spacing.
3. Piping shall be supported at all branch ends and at all changes of direction, as close as practical to the fitting to avoid introducing excessive torsional stresses into the system.
4. Directly support (or if need be, immediately adjacent to) concentrated loads in the system, such as valves and other appurtenances.
5. Allowances must be made for thermal expansion and contraction of the piping system where temperature fluctuations can reasonably be expected to produce such movement. Provide and place hangers accordingly so as not to restrict.
6. Plastic piping systems shall not be placed alongside steam or other high temperature pipe lines or other high temperature objects.
7. Drainage piping shall be supported at trap arms as close as possible to the trap and all closet bends shall be supported and braced.

U. Installation of solvent cement joints for PVC and CPVC piping shall be in strict conformity with the requirements of ASTM D2855 and manufacturer's published instructions.

V. Provide approved heavy duty transition coupling at each transition from above ground cast iron pipe to underground PVC pipe as specified elsewhere in this section. Transition shall be made as close as possible to the floor for sanitary DWV piping systems and at test tee "minimum 12 inches A.F.F." for storm drainage piping. Support vertical cast iron pipe from floor anchors using riser clamp and galvanized all thread rod as specified in Section 22 05 29.

W. All grooved system tools and components (couplings, adapters, fittings, gaskets, and specialties) shall be the product of a single domestic system manufacturer.

X. Grooved pipe system manufacturer shall provide on-site training for contractor's field personnel by a factory trained representative in the proper use of grooving tools, application of groove, and product installation. Factory trained representative shall periodically visit the job site and inspect installation. Contractor shall remove and replace any improperly installed products at no additional cost to the owner.

3.2 APPLICATION

A. Provide union downstream of all valves at equipment or apparatus connections.

B. Provide unions downstream of all threaded isolation valves in the domestic water system to facilitate any future valve replacement.

C. Provide male adapters each side of threaded valves in copper piped system. Sweat solder adapters to tube prior to make-up of threaded connections.

D. Provide approved, accessible isolation valves for shut-off and to isolate all equipment items and distinct parts of systems. Isolation valves shall be provided for both hot and cold water in locations including, but not necessarily limited to, the following:

1. At main water entry upstream of any devices or branch line distribution. Include a hose-end drain valve, strainer, pressure gauge, and test tee with valve inside the building at each domestic water service.
2. At each floor for each domestic water tap branching off from a vertical riser.
3. At each domestic water branch line capped for future use.
4. At each restroom or restroom group, including individual (private) restrooms. Provide above lay-in ceiling adjacent to the restroom or above a minimum 18"x18" access panel for hard ceiling applications.
5. In corridors to allow for isolation of building wings, sections, areas.
6. At each hose bibb, wall hydrant, roof hydrant, hose reel, and trap primer device (except for flush valve or tailpiece type trap primer devices).
7. At each domestic water branch line within 24” of the corresponding main.
8. At each plumbing fixture not otherwise served by a localized fixture group isolation valve.

E. Each plumbing water rough-in stub out shall be fitted with a supply stop.

F. Valves installed in insulated piping shall be fitted with extended lever operators of sufficient length to raise handle above the insulation jacket material. Where valve is used for throttling service (such as downstrream of a circulator), the valve handle shall be equipped with an adjustable memory stop device and the valve shall be set accordingly.

G. Provide non-slam type check valves on discharge lines from all water pumps. Install at a minimum length of 5 times the pipe diameter from the pump and in accordance with manufacturer’s installation recommendations.

H. Provide hose end drain valves at the following locations:
1. Equipment
2. Base of each water riser
3. Low points in water mains, risers, horizontal piping, and branches
4. Wherever required to drain water piping

3.3 ERECTION TOLERANCES

A. All gravity drainage piping shall be provided at a uniform and continuous slope in accordance with the prevailing plumbing code and as described below. If any of the criteria below conflicts with the prevailing code then the code requirements shall govern:
1. Gravity piping 3" and smaller shall be provided at no less than 1/4" per foot slope.
2. Gravity piping 4" and larger shall be provided at no less than 1/8" per foot slope.
3. Where the code allows for a shallower slope than indicated above, this shall be allowed if required per project conditions.
4. Where the code requires a steeper slope than inidcated above (such as for grease waste piping) than such requirements shall control.

B. All vent and branch vent pipes shall be graded and connected as to drip back by gravity to the drainage pipe it serves. A slope of 1 inch per 40 feet will suffice for this requirement, subject to the approval of the local Authority Having Jurisdiction.

C. Slope all horizontal water piping with uniform pitch of 1/8 inch per 10 feet to low points to allow for complete system drainage. For long runs, where constant pitch cannot be maintained, provide intermediate low points and rise up again from such locations. Slope horizontal branches back to mains or risers. Provide clearly identified supplementary drain valves where hose bibbs, hydrants, or sill cocks will not suffice for this requirement.

3.4 CLEANING AND DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Ensure to purge, clean, and disinfect new piping and parts of existing domestic water piping that have been altered, extended, or repaired before placing system into service.

B. Provide purging, cleaning and disinfection as prescribed by the Authority Having Jurisdiction. If methods are not prescribed, provide as described below and in accordance with AWWA C651.
   1. All domestic water systems shall be complete, thoroughly flushed clean and free of all foreign matter or erection residue.
   2. Ensure PH of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
   3. On building side of the main shut off valve, provide a 3/4" connection through which chlorine can be introduced into the water piping
   4. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, in sufficient quantity to obtain 50 to 80 mg/L residual free chlorine solution throughout the entire domestic water piping systems.
   5. Bleed water from outlets as required to ensure complete distribution and test for disinfectant residual at a minimum 15 percent of total outlets.
   6. Maintain disinfectant in system for 24 hours.
   7. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
   8. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
   9. Take samples no sooner than 24 hours after flushing, from 5 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

C. Prepare and submit complete written reports of all purging, cleaning, and disinfecting activities to the Owner and Engineer.

3.5 SERVICE CONNECTIONS

A. Provide new sanitary and storm sewer services connecting to existing building services or utility lines as shown on the drawings.

B. Before commencing work, field verify invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover as required.

C. Provide new domestic water service connecting to existing building services or utility lines as shown on plans. Assure connections are in compliance with requirements of the jurisdiction having authority.

D. Extension of services to the building shall be fabricated from the same materials as the utility service lines or those materials specified herein.

E. Should points of connection vary from those indicated on the drawings contractor shall properly allow for this in the actual connections field fabricated.

3.6 RODDING SEWERS

A. All sanitary soil and waste lines, both in the building and out, shall be rodded out after completion of the installation.

B. This Work shall be done, as part of the contract, to make certain that all lines are clear, and any obstruction that may be discovered shall be removed immediately. Rodding shall be accomplished by utilizing a rotary cutter, which shall be full size of pipe being cleaned.

3.7 VIDEO INSPECTION AND DOCUMENTATION

A. It shall be the responsibility of the contractor to retain the services of a qualified, independent company (third party, other than the installing plumbing contractor) with no less than ten (10) years of experience in digital video camera inspection/investigation of plumbing drainage waste and vent lines for commercial/institutional building projects.

B. The independent company shall perform a complete video camera inspection of all waste piping buried inside the building.
   1. This shall include sanitary waste and any specialty waste (grease waste, oily waste, etc.) systems and shall extend from the building all the way to any associated outdoor traps/interceptors.
   2. For renovation/addition projects, this shall include all existing waste piping being connected to or otherwise modified and this inspection shall occur both prior to and after work is completed.

C. The independent company shall create a permanent digital video record of their inspection with accompanying definitive identification (audio or visual) to indicate different systems and different areas of the systems inspected.

D. The independent company shall prepare a comprehensive written report including, but not necessarily limited to, the following:
   1. Complete company contact information.
   2. Project name and address.
   3. Date(s), time(s), and conditions during the inspection(s).
   4. Name(s) of the operator(s) performing the inspection(s).
   5. A general summary of the inspection results.
   6. A written description of any and all material and/or installation deficiencies or irregularities found, with accompanying pictorial documentation. This shall include conditions such as:
      a. Deformed or damaged piping
      b. Full or partial blockage of piping
      c. Deleterious material or debris within the piping
      d. Slope deficiencies (inadequate, inconsistent, or absent slope)
      e. Valleys or “dips” in the piping
      f. Improper fittings in the piping including reductions in pipe size in the direction of flow

E. The written report shall be submitted under this Section but separately from other submittals of this Section. This shall occur immediately prior to substantial completion.

F. The written report and the digital video record (all on USB flash drive) shall also be submitted as part of the Project Record Documents to the Dallas ISD designated representative.

3.8 TESTING OF PLUMBING PIPING SYSTEMS

A. During the progress of the work and upon completion, tests shall be made as specified herein and as required by Authorities Having Jurisdiction, including Inspectors, Owner or Architect. The Architect or duly authorized Construction Inspector shall be notified in writing at least 2 working days prior to each test or other Specification requirement which requires action on the part of the Construction Inspector.

B. Tests shall be conducted as part of this work and shall include all necessary instruments, equipment, apparatus, and service as required to perform the tests with qualified personnel. Submit proposed test procedures, recording forms, and test equipment for approval prior to the execution of testing.

C. Tests shall be performed before piping of various systems have been covered or furred-in. For insulated piping systems testing shall be accomplished prior to the application of insulation.

D. All piping systems shall be tested and proved absolutely tight for a period of not less than 24 hours. Tests shall be witnessed by the Architect or an authorized representative and pronounced satisfactory before pressure is removed or any water drawn off.

E. Leaks, damage or defects discovered or resulting from test shall be repaired or replaced to a like new condition. Leaking pipe joints, or defective pipe, shall be removed and replaced with acceptable materials. Test shall be repeated after repairs are completed and shall continue until such time as the entire test period expires without the discovery of any leaks.

F. Wherever conditions permit, each piping system shall thereafter be subjected to its normal operating pressure and temperature for a period of no less than five 5 days. During that period, it shall be kept under the most careful observation. The piping systems must demonstrate the propriety of their installation by remaining absolutely tight during this period.

G. Domestic Water: Pressure test at one and one half times the normal working pressure or 125 psig, whichever is the greater, for 24 hours.

H. Sanitary Soil, Waste and Vents and Storm Sewer:
   1. After the rough-in soil, waste and vent and other parts of the sanitary sewer including branch laterals have been set from the lowest level, at point of connection to existing utility lines, to above the floor line, all outlets shall be temporarily plugged or capped, except as are required for testing as described herein. Ground work shall not permit the backfill of trenches to cover any joints until the completion of testing. Back fill shall be limited to mid sections of full joints of piping only. For pipe in ground the piping shall be readied as described herein and fillled with water to a verifiable and visible level to 10' above the lowest portions of the system being tested.

2. On multi-level buildings only one floor level shall be tested at a time. Each floor shall be tested from a level below the structure of the floor, or the outlet of the building in the case of the lowest level, to a level of 12 inches above the floor immediately above the floor being tested, or the top of the highest vent in the case of the highest building level. The pipes for the level being tested shall be filled with water to a verifiable and visible level as described above and be allowed to remain so for 24 hours. If after 24 hours the level of the water has been lowered by leakage, the leaks must be found and stopped, and the water level shall again be raised to the level described, and the test repeated until, after a 24 hour retention period, there shall be no perceptible lowering of the water level in the system being tested.
3. Additionally, it shall be the responsibility of the contractor to retain the services of a qualified, independent company (third party, other than the installing plumbing contractor) to conduct a smoke test to demonstrate the integrity of these systems to the complete satisfaction of the Owner's duly authorized representative. Such tests shall be conducted and completed before any joints in plumbing are concealed or made inaccessible.

3.9 COMPLETE FUNCTIONING OF WORK

A. All work reasonably implied as essential to the complete functioning of the systems shown on the Drawings and Specification shall be completed as part of the work of this Division, unless specifically stated otherwise. It is the intention of the Drawings and Specification to establish the type and function of systems but not to set forth each item essential to the functioning of any system. In case of doubt as to the work intended or in the event of amplification or clarification thereof, the Contractor shall call upon the Architect for Supplementary Instructions and Drawings, etc.

END OF SECTION 22 10 00

SECTION 22 11 19 - PLUMBING SPECIALTIES

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein

B. The Basic Materials and Methods, Section 22 02 00, are included as a part of this Section as though written in full in this document

1.2 SCOPE

A. The scope of the work shall include the furnishing and complete installation of the specialties covered by this Section, with all appurtenances, ready for the Owner's use

B. Include the following work in addition to items normally part of this Section:
   1. Hose Bibbs and Hydrants
   2. Water Hammer Arresters
   3. Strainers and Filters
   4. Thermostatic Mixing Valves
   5. Floor Drains and Floor Sinks
   6. Cleanouts
   7. Roof Drains and Overflow Nozzles

1.3 RELATED WORK

A. Section 22 05 29 - Hangers and Support for Plumbing Piping and Equipment

B. Section 22 10 00 - Plumbing Piping

C. Section 22 30 00 - Plumbing Equipment

D. Section 22 40 00 - Plumbing Fixtures

1.4 REFERENCES

A. ANSI Z358.1 - American National Standard for Emergency Eyewash and Shower Equipment; 2014.

B. ASME A112.6.3 - Floor Drains; 2022.

C. ASME A112.6.4 - Roof, Deck, and Balcony Drains; 2022.

D. ASSE 1010 - Performance Requirements for Water Hammer Arresters; 2004.

E. ASSE 1052 - Performance Requirements for Hose Connection Backflow Preventers; 2016.

F. PDI-WH 201 - Water Hammer Arresters; 2017.

G. ASME A112.6.7 - Sanitary Floor Sinks

H. ASSE 1057 - Performance Requirements for Freeze Resistant Sanitary Yard Hydrants with Backflow Protection

I. ASSE 1069 - Performance Requirements for Automatic Temperature Control Mixing Valves

J. ASSE 1070 - Performance Requirements for Water Temperature Limiting Devices

K. AWWA C510 - Standard for Double Check Valve Backflow Prevention Assembly

L. NSF 61 - Drinking Water System Components - Health Effects

1.5 QUALITY ASSURANCE

A. Manufacturer: For each product specified, provide components by the same manufacturer throughout.

1.6 SUBMITTALS

A. Submit under provisions of Division One.

B. Submit shop drawings and product data under provisions of Division One.

C. Include component sizes, rough-in requirements, service sizes, and finishes.

D. Manufacturer's Installation Instructions: Indicate assembly and support requirements.

1.7 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division One.

B. Record actual locations of equipment and backflow preventers.

1.8 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division One.

B. Operation Data: Indicate frequency of treatment required for interceptors and separators.

C. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.9 DELIVERY, STORAGE, AND HANDLING

A. DELIVERY: Deliver clearly labeled specialties to; and store, protect and handle products on site in accordance with the provisions of Division One.

B. TIMING AND COORDINATION: Arrange for delivery of materials to allow for minimum storage time at the project site. Coordinate with the scheduled time of installation.

C. ACCEPTANCE: Accept specialties on site in original factory packaging. Inspect for damage. Damaged specialties shall not be acceptable.

D. STORAGE: Store materials in a clean, dry location, protected from weather and damage.

1.10 EXTRA MATERIALS

A. Furnish under provisions of Division One.

B. Provide two loose keys for hose bibbs and hydrants and spare hose end vacuum breakers.

1.11 OPERATIONS PERSONNEL TRAINING

A. Provide a training session for the owner's operations personnel. Training session shall be performed by a qualified person who is knowledgeable in the subject system/equipment. Submit a training agenda two weeks prior to the proposed training session for review and approval. Training session shall include at the minimum:
   1. Purpose of equipment.
   2. Principle of how the equipment works.
   3. Important parts and assemblies.
   4. How the equipment achieves its purpose and necessary operating conditions.
   5. Most likely failure modes, causes, and corrections.
   6. On site demonstration.

1.12 REGULATORY REQUIREMENTS

A. Conform to applicable codes for the provision and installation of all required backflow prevention devices.

B. Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

C. Provide backflow prevention assembly test and maintenance report for all devices. A printed and signed form by the licensed tester that performed the work shall be provided both to the Owner and to the Public Water System in accordance with TCEQ (Texas Commission on Environmental Quality) requirements.

PART 2 - PRODUCTS

2.1 HOSE BIBBS/HYDRANTS

A. Roof/Post Hydrant: Free-standing, low-lead, self-draining, non-freeze hydrant with cast iron handle and hose thread brass spout atop galvanized pipe riser. Complete with ASSE 1052 anti-siphon vacuum breaker. For rooftop applications provide complete with manufacturer's recommended mounting hardware for a secure installation and coordinate with roofing contractor to ensure a watertight seal is provided per the roofing system and any local code requirements.

B. ACCEPTABLE MANUFACTURERS:
   1. MAPA

2.2 WATER HAMMER ARRESTERS

A. Engineered water hammer arresters: ASSE 1010 listed, lead-free, pre-charged, permanently sealed, maintenance-free, suited for concealed installation, with a working temperature range of 33 to no less than 212 degrees F and a maximum working pressure of no less than 250 psi during pressure surges. Stainless steel or copper body construction. Shall be sized and located in accordance with Plumbing Drainage Institute standard PDI-WH 201.

B. ACCEPTABLE MANUFACTURERS:
   1. P.P.P.

2.3 THERMOSTATIC MIXING VALVES

A. Provide thermostatic mixing valves in accordance with manufacturer's recommendations and as indicated and scheduled on Drawings.
   1. Unless scheduled otherwise, all units other than under-counter point of use units shall be provided complete in lockable cabinet of 16 gage (1.5 mm) prime coated steel when located in finished areas.
   2. All under-counter point of use units shall be provided complete with integral checks and dual stainless steel strainers on inlets for protection against fouling.
   3. Provide ANSI Z358.1 compliant and owner approved emergency thermostatic mixing valves suited to the fixture(s) served to ensure tepid water at all emergency safety fixture locations. 100 degrees F unless required otherwise by the local AHJ, in which case the Owner shall be notified.

B. ACCEPTABLE MANUFACTURERS:
   1. Leonard

2.4 FLOOR DRAINS AND FLOOR SINKS

A. Provide floor drains and floor sinks in accordance with manufacturer's recommendations, as appropriate for floor construction per ASME A112.6.3, and as indicated and scheduled on Drawings.

B. Provide clamping devices for all drains in membrane floor areas.

C. ACCEPTABLE MANUFACTURERS:
   1. J.R. Smith

D. Provide drains of suitable and compatible material for specialized piping systems conveying acid waste.

2.5 CLEANOUTS

A. General: Provide cleanouts as indicated and scheduled on Drawings and also as required by the prevailing code, whether shown on the Drawings or not.

B. Construction: All cleanouts shall have tapered PVC, ABS, or polypropylene plugs.

C. Provide clamping devices for all cleanouts in membrane floor areas.

D. Provide cleanouts of suitable and compatible material for specialized piping systems conveying acid waste.

E. Types:
   1. Finished floor cleanouts: Provide cast iron body, with adjustable floor level assembly, and round nickel bronze scoriated top.
   2. Resilient or tile finished floor cleanouts: Provide cast iron body, with adjustable floor level assembly, and round nickel-bronze top with gasketed water tight cover and depressed top to receive flooring finish material.
   3. Interior finished wall cleanouts: Provide cast iron tee body or cleanout ferrule as required for wall construction and provide counter-sunk plug with stainless steel access cover and securing screw(s).
   4. Interior unfinished accessible cleanouts: Calked or threaded type. Provide bolted stack cleanouts on vertical rainwater leaders.

F. ACCEPTABLE MANUFACTURERS:
   1. J.R. Smith

2.6 TRAP PRIMERS

A. General: Provide trap primers as indicated and scheduled on Drawings and in accordance with manufacturer’s recommendations.

B. ACCEPTABLE MANUFACTURERS:
   1. P.P.P.

2.7 ROOF DRAINS, PLANTER DRAINS, AND OVERFLOW NOZZLES

A. Roof drains (RD): ASME A112.6.4; Lacquered cast iron body with sump, removable aluminum dome strainer, membrane flange and clamp with integral gravel stop, adjustable underdeck clamp, roof sump receiver, waterproofing anchor flange, adjustable extension as required for insulation, perforated or slotted ballast guard extension for inverted roof.

B. Roof overflow drains (OD): Lacquered cast iron body and features similar to roof drain, with 2 inch external water dam or pipe extended to 2 inches above flood elevation.

C. Planter drains: Lacquered cast iron body with flange, integral clamping collar, seepage openings and either adjustable perforated standpipe (length as necessary) with secured dome or dome with secured stainless steel screen.

D. ACCEPTABLE MANUFACTURERS:
   1. J.R. Smith

PART 3 - EXECUTION

3.1 INSTALLATION AND APPLICATION

A. Install specialties in accordance with manufacturer's instructions to provide intended performance.

B. Water hammer arresters:

1. The contractor shall provide water hammer arresters as shown on Drawings and also in accordance with PDI-WH 201, whether shown on Drawings or not.
2. Water hammer arresters shall be PDI certified and sized and placed as recommended by manufacturer.
3. Provide above lay-in ceiling, within chase or wall or above solid ceiling complete with access panel, or otherwise accessible location complete with isolation valve to facilitate replacement.
4. Provide for both domestic hot and cold water services.
5. At single toilet installations, provide within 3'-0" of water closet fixture or per manufacturer's recommendations.
6. Contractor shall ensure to provide as-built drawings which indicate all final water hammer arrestor locations and sizes.
7. The use of air chambers for the control of water hammer shock shall not be acceptable.

C. Cleanouts:
1. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanouts for rodding of drainage system.
2. All cleanouts outside of building on grade shall be set in an 18" x 18" x 4" thick concrete pad, flush with final grade/paving.
3. All cleanouts shall be the same nominal size as the pipe they serve, up to 4 inches. For pipes larger than 4 inches, provide a 4 inch cleanout.
4. Each gang restroom shall be provided with at least two (2) horizontal and at least one (1) vertical cleanout.
5. In finished spaces, vertical cleanouts shall be located within walls and shall be provided with an access door.
6. Stand-alone lavatories shall be provided with both a horizontal and a vertical cleanout.

END OF SECTION 22 11 19

SECTION 22 30 00 - PLUMBING EQUIPMENT

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. The Basic Materials and Methods, Section 22 02 00, are included as a part of this Section as though written in full in this document.

1.2 SCOPE

A. The scope of the work shall include the furnishing and complete installation of the equipment covered by this Section, with all appurtenances, ready for the Owner's use.

B. Include the following work in addition to items normally part of this Section:
   1. Domestic Water Heaters

1.3 RELATED SECTIONS

A. Section 22 05 29 - Hangers and Support for Plumbing Piping and Equipment

B. Section 22 10 00 - Plumbing Piping

C. Section 22 11 19 - Plumbing Specialties

D. Section 26 05 19 - Wire, Cable and Related Materials

1.4 REFERENCES

A. 10 CFR 430, Appendix E to Subpart B - Uniform Test Method for Measuring the Energy Consumption of Water Heaters; Current Edition.

B. ANSI Z21.10.3 - Gas-Fired Water Heaters - Volume III - Storage Water Heaters with Input Ratings Above 75,000 Btu per Hour, Circulating and Instantaneous; 2015.

C. ANSI Z21.22 - American National Standard for Relief Valves for Hot Water Supply Systems; 2015 (Reaffirmed 2020).

D. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1: Rules for Construction of Pressure Vessels; 2025, with Errata .

F. ICC (IECC) - International Energy Conservation Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. NFPA 54 - National Fuel Gas Code; 2024.

H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. UL 1453 - Standard for Electric Booster and Commercial Storage Tank Water Heaters; Current Edition, Including All Revisions.

1.5 QUALITY ASSURANCE

A. Manufacturer: For each product specified, provide components by the same manufacturer throughout.

B. Perform Work in accordance with Authorities Having Jurisdiction.

C. Provide pumps with manufacturer's name, model number, and rating/capacity identified.

D. Ensure products and installation of specified products are in conformance with recommendations and requirements of the following organizations:
   1. American Gas Association (AGA).
   2. National Sanitation Foundation (NSF).
   3. American Society of Mechanical Engineers (ASME).
   4. National Board of Boiler and Pressure Vessel Inspectors (NBBPVI).
   5. National Electrical Manufacturers' Association (NEMA).
   6. Underwriters Laboratories (UL).
   7. American Society of Plumbing Engineers (ASPE)

E. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.

1.6 SUBMITTALS

A. Submit under provisions of Division One.

B. Shop Drawings:
   1. Include water heater and packaged heating system dimensions, sizes and locations of all connections, and performance data.
   2. Include dimensions of tanks, tank lining and insulation methods, anchors, attachments, lifting points, sizes and locations of all connections and drains.
   3. Include water softening equipment dimensions, sizes and locations of all connections, performance data and capacities, backwash requirements.
   4. Include booster system skid dimensions, sizes and locations of all connections, and performance data. Include such information for any field connected items, including, but not necessarily limited to, hydro-pneumatic tanks.
   5. Include manufacturer’s recommended space requirements, clearances, and maintenance access.

C. Product Data:
   1. Include dimension drawings of water heaters indicating components and connections to other equipment and piping.

2. Indicate pump type, materials of construction, capacity, power requirements, and any affected adjacent construction.
3. Submit certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
4. Provide electrical characteristics and power and controls connection requirements/capabilities.

D. Manufacturer's Installation Instructions.

1.7 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division One.

B. Record actual locations of equipment.

C. Provide written start-up reports.

1.8 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division 22.

B. Operation Data: Include manufacturer’s operating instructions, common trouble conditions and remedies, and trouble-shooting protocols.

C. Maintenance Data: Include routine maintenance items and corresponding intervals, identify typical replacement parts including part numbers and availability. Provide location and full contact information including after-hours maintenance/support telephone numbers for manufacturer authorized maintenance and repair companies.

1.9 DELIVERY, STORAGE, AND HANDLING

A. DELIVERY: Deliver clearly labeled equipment to; and store, protect and handle products on site in accordance with the provisions of Division One.

B. TIMING AND COORDINATION: Arrange for delivery of equipment to allow for minimum storage time at the project site. Coordinate with the scheduled time of installation.

C. ACCEPTANCE: Accept equipment on site in original factory packaging. Inspect for damage. Damaged equipment shall not be acceptable.

D. STORAGE: Store equipment in a clean, dry location, protected from weather and damage.

1.10 EXTRA MATERIALS

A. Furnish under provisions of Division One.

B. Provide two sets of electric water heater elements.

1.11 OPERATIONS PERSONNEL TRAINING

A. Provide a training session for the owner’s operations personnel. Training session shall be performed by a qualified person who is knowledgeable in the subject system/equipment. Submit a training agenda two weeks prior to the proposed training session for review and approval.

B. Training session shall include at the minimum:
   1. Purpose of equipment.
   2. Principle of how the equipment works.
   3. Important parts and assemblies.
   4. How the equipment achieves its purpose and necessary operating conditions.
   5. Most likely failure modes, causes, and corrections.
   6. On site demonstration.

1.12 REGULATORY REQUIREMENTS

A. Conform to AGA, NSF, NFPA 54, NFPA 70 and UL 1453 requirements for water heaters.

B. Conform to ASME BPVC-VIII-1 for manufacture of pressure vessels for heat exchangers.

C. Conform to water heater minimum efficiency requirements prescribed by ICC (IECC) and ASHRAE Std 90.1 I-P

D. Water heaters shall be tested and rated in compliance with 10 CFR 430, Appendix E to Subpart B or ANSI Z21.10.3 as applicable.

E. Temperature and pressure relief valves shall comply with ANSI Z21.22

1.13 WARRANTY

A. Provide one year warranty under provisions of Division One.

B. Warranty: Include coverage of domestic water heaters and packaged systems, water storage tanks, water softeners, and domestic pressure booster systems.

PART 2 - PRODUCTS

2.1 COMMERCIAL ELECTRIC WATER HEATERS (STORAGE TYPE)

A. Acceptable Manufacturers:
   1. A.O. Smith
   2. Lochinvar
   3. R.B.I.

B. Type: Factory-assembled and wired, electric, vertical storage.

C. Tank: Glass lined welded steel; 4 inch diameter inspection port (when applicable), thermally insulated with minimum 2 inches glass fiber encased in corrosion-resistant steel jacket; baked-on enamel finish.

D. Controls: Automatic immersion water thermostat; externally adjustable temperature range from 60 to 180 degrees F (16 to 82 degrees C), flanged or screw-in nichrome elements, high temperature limit thermostat.

E. Accessories: Brass water connections and dip tube, drain valve, high-density magnesium anode, and ASME rated temperature and pressure relief valve.

F. Provide training per 1.11.

PART 3 - EXECUTION

3.1 WATER HEATER INSTALLATION

A. Install water heaters in accordance with manufacturer's instructions and to AGA, NSF, NFPA 54 and UL requirements.

B. Coordinate with plumbing piping and related work to achieve operating system.

C. Provide venting and vent piping in accordance with code and manufacturer's recommendations.

D. Provide a properly sized thermal expansion tank downstream of the associated check valve in the cold water supply to the heater.

E. Provide a thermometer at the hot water outlet piping from each water heater.

F. Provide a line sized shut-off valve in the cold water supply to and in the hot water outlet from each heater, close to each heater.

G. Provide a line size plug cock in the gas supply close to each gas-fired water heater.

H. Provide approved dielectric couplings at all hot and cold water connections to each heater/tank, and at the T&P relief valve connection.

I. All tank type water heaters with more than 20 gallons of storage capacity shall be floor mounted on a concrete housekeeping pad, unless specifically indicated otherwise on the Drawings.

J. Each tank type water heater shall be installed within a suitably sized galvanized drain pan. Securely elevate the base of each heater above the floor of the drain pan with structurally sound, non-ferrous, non-absorbent supports. Drain pan shall have no less than a 3/4" piped drain outlet.

K. All water heater drain lines shall be full size, copper, and routed to indirect waste receptors.

L. Startup:
   1. Startup of all water heaters shall be in strict accordance with manufacturer's recommendations.
   2. Ensure that storage type water heaters are full of water and downstream fixtures have been run for no less than 3 minutes in order to purge any trapped air from the water heater tank prior to heater startup.

3.2 PUMP INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide air cock and drain connection on horizontal pump casings.

C. Provide line sized isolating valve and strainer on suction and line sized soft seated check valve and balancing valve on discharge.

D. Provide line sized isolating valve and line sized soft seated check valve on each submersible or sump pump discharge.

E. Provide line sized isolating valve and strainer at inlet and line sized soft seated check valve and line sized isolating valve at outlet of each in line circulator pump. Provide unions on both sides of pump.

F. Decrease from line size with long radius reducing elbows or reducers. Support piping adjacent to pump such that no weight is carried on pump casings. Provide supports under elbows on pump suction and discharge line sizes 4 inches and over.

G. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

H. Align and verify alignment of base mounted pumps prior to start-up. Provide alignment certificate to engineer prior to start-up.

END OF SECTION 22 30 00

SECTION 22 40 00 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. Section 22 02 00 - Basic Materials and Methods for Plumbing shall be included as a part of this Section as though written in full in this document.

1.2 SCOPE

A. The scope of the work shall include the furnishing and complete installation of the fixtures covered by this Section, with all appurtenances, ready for the Owner's use.

B. Include the following work in addition to items normally part of this Section:
   1. Plumbing Fixtures
   2. Faucets, Supplies, and Trim
   3. Flushometers

1.3 RELATED WORK

A. Section 22 05 29 - Hangers and Support for Plumbing Piping and Equipment

B. Section 22 10 00 - Plumbing Piping

C. Section 22 11 19 - Plumbing Specialties

D. Section 22 30 00 - Plumbing Equipment

1.4 QUALITY ASSURANCE

A. Manufacturer: For each product specified, provide components by the same manufacturer throughout.

B. Warranty: Warrant the work specified herein for one year against becoming unserviceable or causing an objectionable appearance resulting from defective or non-conforming materials and workmanship.

C. Defects shall include, but not necessarily be limited to, the following:
   1. Noisy operation.
   2. Noticeable deterioration of finish.
   3. Leakage of water.

1.5 SUBMITTALS

A. Submit under provisions of Division One.

B. Submit product data under provisions of Division One.

C. Include component sizes, rough-in requirements, service sizes, finishes, materials, dimensions, performance information, and accessories.

D. Manufacturer’s Installation Instructions: Indicate assembly and support requirements.

1.6 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division One.

B. Provide pre-printed operating and maintenance instructions for each item specified. Instruct and demonstrate the proper operation and maintenance to the Owner's designated representative.

1.7 DELIVERY, STORAGE, AND HANDLING

A. DELIVERY: Deliver clearly labeled specialties to; and store, protect and handle products on site in accordance with the provisions of Division One.

B. TIMING AND COORDINATION: Arrange for delivery of materials to allow for minimum storage time at the project site. Coordinate with the scheduled time of installation.

C. ACCEPTANCE: Accept specialties on site in original factory packaging. Inspect for damage. Damaged specialties shall not be acceptable.

D. STORAGE: Store materials in a clean, dry location, protected from weather and damage.

1.8 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on the Contract Documents.

B. Confirm and field coordinate that millwork is constructed with adequate provisions for the installation of counter top lavatories and sinks.

PART 2 - PRODUCTS

2.1 PLUMBING FIXTURES

A. GENERAL: Provide plumbing fixtures in accordance with manufacturer’s recommendations and as indicated and scheduled on Drawings. Acceptable manufacturers of each fixture type are as indicated below.
   1. Provide floor-affixed fixture carriers as appropriate for all wall-hung plumbing fixtures unless specifically noted otherwise.
   2. Fixture drilling shall match faucet spread and match any related trim and accessories.
   3. Single hole drilled lavatories are not allowed.

B. WATER CLOSETS, URINALS, LAVATORIES (Vitreous China)
   1. American Standard
   2. Kohler
   3. Sloan

2.2 FAUCETS, SUPPLIES, AND TRIM

A. GENERAL: Provide faucets, supplies, and trim in accordance with manufacturer's recommendations, as appropriate for fixtures to be served, and as indicated and scheduled on Drawings. Acceptable manufacturers for each type of appurtenance are as indicated below.
   1. Flushometer flush rate shall match gallon-per-flush criteria of fixtures served.
   2. Ultra-low flow urinal flushometers are not allowed.
   3. Strainers shall be heavy cast brass chrome plated with matching grid type strainer, with or without overflow as required, 17 gauge seamless brass tailpiece of length determined by installation requirements. Provide complete with washers and brass locknut.
   4. P-traps shall be 17 gauge seamless chrome plated brass, adjustable type. Provide complete with cleanout plug, chrome plated brass slip nuts, wall bend, and wrought brass escutcheon of depth determined by installation requirements.
   5. Angle stops shall be lead-free commercial pattern chrome plated brass, quarter turn ball type with loose key handles. Provide wrought brass escutcheons of depth determined by installation requirements.
   6. Supply risers:
      a. Provide stainless steel braided flexible type at all sensor operated faucets.
      b. Provide chrome plated copper type at all other faucets.
   7. Toilet seats shall be commercial grade and provided complete with stainless steel posts and self-sustaining check hinges.
   8. Pipe trim insulation shall be compliant, white molded vinyl, fade/discoloration-resistant, bacteria/fungal-resistant insulation.
   9. All shower valves shall have integral stops and be anti-scald type.
   10. Where an exposed flush valve assembly will conflict with the installation height of a grab bar or where there will be insufficient clearance above the top cover of an exposed flush valve for maintenance access relative to the installation height of a grab bar, provide an offset type flush valve tube. Make water rough-in and other adjustments as necessary for a compliant and functioning installation.

B. FAUCETS
   1. Sloan
   2. T&S Brass
   3. Delta Commercial

C. SUPPLY STOPS
   1. McGuire
   2. Chicago

D. CHROME PLATED TUBULAR BRASS
   1. McGuire
   2. Zurn
   3. Kohler

E. TOILET SEATS
   1. Church
   2. Bemis
   3. American Standard
   4. Zurn

F. PIPE TRIM INSULATION
   1. Plumberex

PART 3 - EXECUTION

3.1 PREPARATION

A. EXAMINATION OF CONDITIONS: Examine conditions affecting this work. Report unsatisfactory conditions to the proper authority and do not proceed until those conditions have been corrected. Commencing work implies acceptance of existing conditions as satisfactory to the outcome of this work.

B. Coordinate cutting of floor construction to receive drains to required invert elevations.

3.2 INSTALLATION

A. Install fixtures in locations and heights as shown on Drawings and as directed by the Architect.

B. Install materials plumb, level, securely, and in accordance with manufacturer's recommendations.

C. All rough-in pipe openings for final connections with supply, waste, vent, and storm systems shall be closed with caps or plugs during early stages of construction and installation. Tape shall not be considered sufficient protection.

D. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

E. Provide ball valves in piping serving batteries of fixtures. Label stops "Hot" and "Cold." Valves shall be located above accessible ceilings. If ceilings are not accessible, provide access panels of adequate size to ensure valves are fully accessible and can be fully operated.

F. Emergency safety fixtures:
   1. Provide lockable ball valves in piping serving emergency safety fixtures and clearly label such valves as to the fixtures served.
   2. Provide owner approved emergency thermostatic mixing valves to ensure tepid water at all locations. 100 degrees F unless required otherwise by the local AHJ, in which case the Dallas ISD designated representative shall be notified.

G. Plumbing fixtures shall be supported by a concealed carrier where required to properly support the fixture specified. All carriers to be securely mounted, bolted and checked prior to concealment.

H. Caulk around fixtures with best grade white silicone caulking. Do not use grout.

I. All handles on supply and drainage fittings or other brass items shall be properly lined up and adjusted. Fittings shall not be left in any haphazard manner.

J. All fixtures shall have individual chrome plated heavy pattern loose key quarter-turn cutoff stops on supply lines, complete with escutcheons. Where same are not specified as a part of the fixture trim, they shall be installed as close to fixtures as possible in the hot and cold water supply.

K. Install each fixture with trap, easily removable for servicing and cleaning.

L. All showers and similar installations shall be installed with type “L” copper pipe between shower valve and shower head rough-in. The termination point shall have a brass drop ear elbow for shower head arm connection. Contractor shall provide proper anchoring support.

M. For floor-mounted water closets, ensure that gasket assembly at closet flange is provided complete with urethane gasketing.

N. For sensor operated fixtures, ensure to coordinate power needs and locations accordingly with electrical contractor. Battery powered fixtures are not allowed. Transformers for hard-wired, sensor operated fixtures shall be:
   1. Located above ceiling at fixtures where ceiling is lay-in type.
   2. Located accessibly above celing in the adjacent corridor where ceiling at fixture is a hard ceiling.

3.3 INTERFACE WITH OTHER PRODUCTS

A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

B. Review architectural drawings. Confirm configuration and orientation of shower controls and trim prior to rough-in and installation.

3.4 ADJUSTING

A. Adjust work under provisions of Division One.

B. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.5 CLEANING

A. Clean work under provisions of Division One.

B. At completion clean plumbing fixtures and appurtenances.

3.6 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of Division One.

B. Do not permit use of fixtures.

3.7 ADA ACCESSIBLE FIXTURES

A. At all locations required to be accessible, such fixtures, controls, and final installations shall comply with the requirements of ADA and any applicable state accessibility standards. Install fixtures to heights, indicated on architectural drawings.

B. All exposed water supply and drain pipes under accessible lavatories and sinks shall be insulated with securely fastened pipe trim insulation kits of the proper model for the fixtures specified.

C. Wall mounted drinking fountains and coolers which protrude into passages or corridor space, whether single or paired with an adjacent accessible fixture, shall be supplied with a matching skirt or apron to lower the underside clearance of the non-accessible fixture equal to that required for accessible fixture.

END OF SECTION 22 40 00

SECTION 23 02 00 - BASIC MATERIALS AND METHODS FOR HVAC

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all Work herein.

B. The Contract Drawings indicate the extent and general arrangement of the systems. If any departure from the Contract Drawings is deemed necessary by the Contractor, details of such departures and the reasons therefore, shall be submitted to the Architect/Engineer for review as soon as practicable. No such departures shall be made without the prior written approval of the Architect/Engineer.

C. Notwithstanding any reference in the Specifications to any article, device, product, material, fixture, form or type of construction by name, make or catalog number, such reference shall not be construed as limiting competition; and the Contractor, in such cases, may at his option use any article, device, product, material, fixture, form or type of construction which in the judgment of the Architect/Engineer, expressed in writing, is the equivalent of that specified.

1.2 SCOPE OF WORK

A. The Work included under this Contract consists of the furnishing and installation of all equipment and material necessary and required to form complete and functioning systems in all of their various phases, all as shown on the accompanying Drawings and/or described in these Specifications. The Contractor shall review all pertinent drawings, including those of other contracts, prior to commencement of Work.

B. This Division requires the furnishing and installing of all items as specified herein, indicated on the Drawings or reasonably inferred as necessary for safe and proper operation; including every article, device or accessory (whether or not specifically called for by item) reasonably necessary to facilitate each system's functioning as indicated by the design and the equipment specified. Elements of the work include, but are not limited to, materials, labor, supervision, transportation, storage, equipment, utilities, all required permits, licenses and inspections. All work performed under this Section shall be in accordance with the Project Manual, Drawings and Specifications and is subject to the terms and conditions of the Contract.

C. The approximate locations of Mechanical (HVAC) items are indicated on the Drawings. These Drawings are not intended to give complete and accurate details in regard to location of outlets, apparatus, etc. Exact locations are to be determined by actual measurements at the building, and will in all cases be subject to the review of the Owner or Engineer, who reserves the right to make any reasonable changes in the locations indicated without additional cost to the Owner.

D. Items specifically mentioned in the Specifications but not shown on the Drawings and/or items shown on Drawings but not specifically mentioned in the Specifications shall be installed by the Contractor under the appropriate section of work as if they were both specified and shown.

E. All discrepancies between the Contract Documents and actual job-site conditions shall be reported to the Owner or Engineer so that they will be resolved prior to bidding. Where this cannot be done at least 7 working days prior to bid; the greater or more costly of the discrepancy shall be bid. All labor and materials required to perform the work described shall be included as part of this Contract.

F. It is the intention of this Section of the Specifications to outline minimum requirements to furnish the Owner with a turn-key and fully operating system in cooperation with other trades.

G. It is the intent of the above "Scope" to give the Contractor a general outline of the extent of the Work involved; however, it is not intended to include each and every item required for the Work. Anything omitted from the "Scope" but shown on the Drawings, or specified later, or necessary for a complete and functioning heating, ventilating and air conditioning system shall be considered a part of the overall "Scope".

H. The Contractor shall rough-in fixtures and equipment furnished by others from rough-in and placement drawings furnished by others. The Contractor shall make final connection to fixtures and equipment furnished by others.

I. The Contractor shall participate in the commissioning process as required; including, but not limited to, meeting attendance, completion of checklists, and participation in functional testing.

1.3 SCHEMATIC NATURE OF CONTRACT DOCUMENTS

A. The Contract Documents are schematic in nature in that they are only to establish scope and a minimum level of quality. They are not to be used as actual working construction drawings. The actual working construction drawings shall be the reviewed shop drawings.

B. All duct or pipe or equipment locations as indicated on the documents do not indicate every transition, offset, or exact location. All transitions, offsets, clearances and exact locations shall be established by actual field measurements, coordination with the structural, architectural and reflected ceiling plans, and other trades. Submit shop drawings for review.

C. All transitions, offsets and relocations as required by actual field conditions shall be performed by the Contractor at no additional cost to the Owner.

D. Additional coordination with electrical contractor may be required to allow adequate clearances of electrical equipment, fixtures and associated appurtenances. Contractor to notify Architect and Engineer of unresolved clearances, conflicts or equipment locations.

1.4 SITE VISIT AND FAMILIARIZATION

A. Before submitting a bid, it will be necessary for each Contractor whose work is involved to visit the site and ascertain for himself the conditions to be met therein in installing his work and make due provision for same in his bid. It will be assumed that this Contractor in submitting his bid has visited the premises and that his bid covers all work necessary to properly install the equipment shown. Failure on the part of the Contractor to comply with this requirement shall not be considered justification for the omission or faulty installation of any work covered by these Specifications and Drawings.

B. Understand the existing utilities from which services will be supplied; verify locations of utility services, and determine requirements for connections.

C. Determine in advance that equipment and materials proposed for installation fit into the confines indicated.

1.5 WORK SPECIFIED IN OTHER SECTIONS

A. Finish painting is specified. Prime and protective painting are included in the work of this Division.

B. Owner and General Contractor furnished equipment shall be properly connected to Mechanical (HVAC) systems.

C. Furnishing and installing all required Mechanical (HVAC) equipment control relays and electrical interlock devices, conduit, wire and J-boxes are included in the Work of this Division.

1.6 PERMITS, TESTS, INSPECTIONS

A. Arrange and pay for all permits, fees, tests, and all inspections as required by governmental authorities.

1.7 DATE OF SUBSTANTIAL COMPLETION

A. The date of final acceptance shall be the date of substantial completion. Refer to Division One for additional requirements.

B. The date of final acceptance shall be documented in writing and signed by the Architect, Owner and Contractor.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

B. Deliver products to the project at such time as the project is ready to receive the equipment, pipe or duct - properly protected from incidental damage and weather damage.

C. Damaged equipment, duct or pipe shall be promptly removed from the site and new, undamaged equipment, pipe or duct shall be installed in its place promptly with no additional charge to the Owner.

1.9 NOISE AND VIBRATION

A. The heating, ventilating and air conditioning systems, and the component parts thereof, shall be guaranteed to operate without objectionable noise and vibration.

B. Provide foundations, supports and isolators as specified or indicated, properly adjusted to prevent transmission of vibration to the building structure, piping and other items.

C. Carefully fabricate ductwork and fittings with smooth interior finish to prevent turbulence and generation or regeneration of noise.

D. All equipment shall be selected to operate with minimum of noise and vibration. If, in the opinion of the Architect, objectionable noise or vibration is produced or transmitted to or through the building structure by equipment, piping, ducts or other parts of the Work, the Contractor shall rectify such conditions without extra cost to the Owner.

1.10 DELEGATED DESIGN FOR ANCHORAGE OF ROOF MOUNTED EQUIPMENT

A. The Contractor shall engage a qualified professional engineer to design all roof mounted equipment curbs, equipment supports, equipment tie downs, equipment connections, and methods of attachment for components that are to be anchored to the building structure. The design shall comply with wind load and uplift requirements utilizing design criteria per ICC (IBC) and ASCE 7 unless criteria is otherwise indicated in the Construction Documents.

B. Submittal: Signed and sealed engineering analysis data and accompanying details, drawings, and supplemental installation information shall be submitted to the engineer for review.

1.11 APPLICABLE CODES AND STANDARDS

A. Obtain all required permits and inspections for all work required by the Contract Documents and pay all required fees in connection thereof.

B. Arrange with the serving utility companies for the connection of all required utilities and pay all charges, meter charges, connection fees and inspection fees, if required.

C. Comply with all applicable codes, specifications, local ordinances, industry standards, utility company regulations and the applicable requirements which includes and is not limited to the following nationally accepted codes and standards:
   1. Air Moving & Conditioning Association, AMCA.
   2. American Standards Association, ASA.
   3. American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc., ASHRAE.
   4. American Society of Mechanical Engineers, ASME.
   5. American Society of Plumbing Engineers, ASPE.
   6. American Society of Testing Materials, ASTM.
   7. American Water Works Association, AWWA.
   8. National Bureau of Standards, NBS.
   9. National Fire Protection Association, NFPA.
   10. Sheet Metal & Air Conditioning Contractors' National Association, SMACNA.
   11. Underwriters' Laboratories, Inc., UL.
   12. International Building Code, IBC.
   13. International Energy Conservation Code, IECC.
   14. International Fire Code, IFC.
   15. International Fuel Gas Code, IFGC.
   16. International Mechanical Code, IMC.

D. Where differences existing between the Contract Documents and applicable state or city building codes, state and local ordinances, industry standards, utility company regulations and the applicable requirements of the nationally accepted codes and standards, the more stringent or costly application shall govern. Promptly notify the Engineer in writing of all differences.

E. When directed in writing by the Engineer, remove all work installed that does not comply with the Contract Documents and applicable state or city building codes, state and local ordinances, industry standards, utility company regulations and the applicable requirements of the above listed nationally accepted codes and standards, correct the deficiencies, and complete the work at no additional cost to the Owner.

1.12 DEFINITIONS AND SYMBOLS

A. General Explanation: A substantial amount of construction and Specification language constitutes definitions for terms found in other Contract Documents, including Drawings which must be recognized as diagrammatic and schematic in nature and not completely descriptive of requirements indicated thereon. Certain terms used in Contract Documents are defined generally in this article, unless defined otherwise in Division 01.

B. Definitions and explanations of this Section are not necessarily either complete or exclusive, but are general for work to the extent not stated more explicitly in another provision of the Contract Documents.

C. Indicated: The term "Indicated" is a cross-reference to details, notes or schedules on the Drawings, to other paragraphs or schedules in the Specifications and to similar means of recording requirements in Contract Documents. Where such terms as "Shown", "Noted", "Scheduled", "Specified" and "Detailed" are used in lieu of "Indicated", it is for the purpose of helping the reader locate cross-reference material, and no limitation of location is intended except as specifically shown.

D. Directed: Where not otherwise explained, terms such as "Directed", "Requested", "Accepted", and "Permitted" mean by the Architect or Engineer. However, no such implied meaning will be interpreted to extend the Architect's or Engineer's responsibility into the Contractor's area of construction supervision.

E. Reviewed: Where used in conjunction with the Engineer's response to submittals, requests for information, applications, inquiries, reports and claims by the Contractor the meaning of the term "Reviewed" will be held to limitations of Architect's and Engineer's responsibilities and duties as specified in the General and Supplemental Conditions. In no case will "Reviewed" by Engineer be interpreted as a release of the Contractor from responsibility to fulfill the terms and requirements of the Contract Documents.

F. Furnish: Except as otherwise defined in greater detail, the term "Furnish" is used to mean supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.

G. Install: Except as otherwise defined in greater detail, the term "Install" is used to describe operations at the project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations, as applicable in each instance.

H. Provide: Except as otherwise defined in greater detail, the term "Provide" is used to mean "Furnish and Install", complete and ready for intended use, as applicable in each instance.

I. Installer: Entity (person or firm) engaged by the Contractor, or its Subcontractor or Sub-subcontractor for performance of a particular unit of work at the project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations, as applicable in each instance. It is a general requirement that such entities (Installers) be expert in the operations they are engaged to perform.

J. Imperative Language: Used generally in Specifications. Except as otherwise indicated, requirements expressed imperatively are to be performed by the Contractor. For clarity of reading at certain locations, contrasting subjective language is used to describe responsibilities that must be fulfilled indirectly by the Contractor or, when so noted, by other identified installers or entities.

K. Minimum Quality/Quantity: In every instance, the quality level or quantity shown or specified is intended as minimum quality level or quantity of work to be performed or provided. Except as otherwise specifically indicated, the actual work may either comply exactly with that minimum (within specified tolerances), or may exceed that minimum within reasonable tolerance limits. In complying with requirements, indicated or scheduled numeric values are either minimums or maximums as noted or as appropriate for the context of the requirements. Refer instances of uncertainty to Owner or Engineer via a request for information (RFI) for decision before proceeding.

L. Abbreviations and Symbols: The language of Specifications and other Contract Documents including Drawings is of an abbreviated type in certain instances, and implies words and meanings which will be appropriately interpreted. Actual word abbreviations of a self-explanatory nature have been included in text of Specifications and Drawings. Specific abbreviations and symbols have been established, principally for lengthy technical terminology and primarily in conjunction with coordination of Specification requirements with notations on Drawings and in Schedules. These are frequently defined in Section at first instance of use or on a Legend and Symbol Drawing. Trade and industry association names and titles of generally recognized industry standards are frequently abbreviated. Singular words will be interpreted as plural and plural words will be interpreted as singular where applicable and where full context of Contract Documents so indicate. Except as otherwise indicated, graphic symbols and abbreviations used on Drawings and in Specifications are those recognized in construction industry for indicated purposes. Where not otherwise noted symbols and abbreviations are defined by the latest ASHRAE Fundamentals Handbook, chapter 34 "Abbreviations and Symbols", ASME and ASPE published standards.

1.13 DRAWINGS AND SPECIFICATIONS

A. These Specifications are intended to supplement the Drawings and it will not be the province of the Specifications to mention any part of the Work which the Drawings are competent to fully explain in every particular and such omission is not to relieve the Contractor from carrying out portions indicated on the Drawings only.

B. Should items be required by these Specifications and not indicated on the Drawings, they are to be supplied even if of such nature that they could have been indicated thereon. In case of disagreement between Drawings and Specifications, or within either Drawings or Specifications, the better quality or greater quantity of work shall be estimated and the matter referred to the Architect or Engineer for review with a request for information and clarification at least 7 working days prior to bid opening date for issuance of an addendum.

C. The listing of product manufacturers, materials and methods in the various sections of the Specifications, and indicated on the Drawings, is intended to establish a standard of quality only. It is not the intention of the Owner or Engineer to discriminate against any product, material or method that is the equivalent of the standards as indicated and/or specified, nor is it intended to preclude open, competitive bidding. The fact that a specific manufacturer is listed as an acceptable manufacturer should not be interpreted to mean that the manufacturer's standard product will meet the requirements of the project design, Drawings, Specifications and space constraints.

D. The Architect or Engineer and Owner shall be the sole judge of quality and equivalence of equipment, materials and methods.

E. Products by other reliable manufacturers, other materials, and other methods, will be accepted as outlined, provided they have equivalent capacity, construction, and performance. However, under no circumstances shall any substitution be made without the written permission of the Architect or Engineer and Owner. Request for prior approval must be made in writing 10 calendar days prior to the bid date without fail.

F. Wherever a definite product, material or method is specified and there is not a statement that another product, material or method will be acceptable, it is the intention of the Owner or Engineer that the specified product, material or method is the only one that shall be used without prior approval.

G. Wherever a definite material or manufacturer's product is specified and the Specification states that products of similar design and equivalent construction from the specified list of manufacturers may be substituted, it is the intention of the Owner or Engineer that products of manufacturers that are specified are the only products that will be acceptable and that products of other manufacturers will not be considered for substitution without approval.

H. Wherever a definite product, material or method is specified and there is a statement that "OR EQUIVALENT" product, material or method will be acceptable, it is the intention of the Owner or Engineer that the specified product, material or method or an "OR EQUIVALENT" product, material or method may be used if it complies with the Specifications and is submitted for review to the Engineer as outline herein.

I. Where permission to use substituted or alternative equipment on the project is granted by the Owner or Engineer in writing, it shall be the responsibility of the Contractor or Subcontractor involved to verify that the equipment will fit in the space available which includes allowances for all required Code and maintenance clearances, and to coordinate all equipment structural support, plumbing and electrical requirements and provisions with the Mechanical (HVAC) Design Documents and all other trades, including Division 26.

J. Changes in architectural, structural, electrical, mechanical, and plumbing requirements for the substitution shall be the responsibility of the bidder wishing to make the substitution. This shall include the cost of redesign by the affected designer(s). Any additional cost incurred by affected Subcontractors shall be the responsibility of this bidder and not the Owner.

K. If any request for a substitution of product, material or method is rejected, the Contractor will automatically be required to furnish the product, material or method named in the Specifications. Repetitive requests for substitutions will not be considered.

L. The Owner or Engineer will investigate all requests for substitutions when submitted in accordance with the requirements listed above; and if accepted, will issue a letter allowing the substitutions.

M. Where equipment other than that used in the design as specified or shown on the Drawings is substituted (either from an approved manufacturers list or by submittal review), it shall be the responsibility of the substituting Contractor to coordinate space requirements, building provisions and connection requirements with their respective trade(s) and all other trades; and to pay all additional costs to other trades, the Owner, the Architect or Engineer, if any, due to the substitutions.

1.14 SUBMITTALS

A. Coordinate with Division 01 for submittal timetable requirements, unless noted otherwise within thirty (30) days after the Contract is awarded. The Contractor shall submit an electronic copy of a complete set of shop drawings and complete data covering each item of equipment or material. The submittal of each item requiring a submittal must be received by the Architect or Engineer within the above thirty-day period. The Architect or Engineer shall not be responsible for any delays or costs incurred due to excessive shop drawing review time for submittals received after the thirty (30) day time limit. The Architect and Engineer will retain a copy of all shop drawings for their files. All literature pertaining to items subject to Shop Drawing submittal shall be submitted at one time. Submittals shall be placed in one electronic file in PDF 8.0 format and bookmarked for individual specification sections. Individual electronic files of submittals for individual specifications shall not be permitted. Each submittal shall include the following items:

1. A cover sheet with the names and addresses of the Project, Architect, MEP Engineer, General Contractor and the Subcontractor making the submittal. The cover sheet shall also contain the section number covering the item or items submitted and the item nomenclature or description.
2. An index page with a listing of all data included in the Submittal.
3. A list of variations page with a listing of all variations, including unfurnished or additional required accessories, items or other features, between the submitted equipment and the specified equipment. If there are no variations, then this page shall state "NO VARIATIONS". Where variations affect the work of other Contractors, then the Contractor shall certify on this page that these variations have been fully coordinated with the affected Contractors and that all expenses associated with the variations will be paid by the submitting Contractor. This page will be signed by the submitting Contractor.
4. Equipment information including manufacturer's name and designation, size, performance and capacity data as applicable. All applicable Listings, Labels, Approvals and Standards shall be clearly indicated.
5. Dimensional data and scaled drawings as applicable to show that the submitted equipment will fit the space available with all required Code and maintenance clearances clearly indicated and labeled at a minimum scale of 1/4" = 1'-0", as required to demonstrate that the alternate or substituted product will fit in the space available.
6. Identification of each item of material or equipment matching that indicated on the Drawings.
7. Sufficient pictorial, descriptive and diagrammatic data on each item to show its conformance with the Drawings and Specifications. Any options or special requirements or accessories shall be so indicated. All applicable information shall be clearly indicated with arrows or another approved method.
8. Additional information as required in other Sections of this Division.

9. Certification by the General Contractor and Subcontractor that the material submitted is in accordance with the Drawings and Specifications, signed and dated in long hand. Submittals that do not comply with the above requirements shall be returned to the Contractor and shall be marked "REVISE AND RESUBMIT".

B. Refer to Division 00 and Division 01 for additional information on shop drawings and submittals.

C. Equipment and materials submittals and shop drawings will be reviewed for compliance with design concept only. It will be assumed that the submitting Contractor has verified that all items submitted can be installed in the space allotted. Review of shop drawings and submittals shall not be considered as a verification or guarantee of measurements or building conditions.

D. Where shop drawings and submittals are marked "REVIEWED", the review of the submittal does not indicate that submittals have been checked in detail nor does it in any way relieve the Contractor from his responsibility to furnish material and perform work as required by the Contract Documents.

E. Shop drawings shall be reviewed and returned to the Contractor with one of the following categories indicated:
   1. REVIEWED: Contractor need take no further submittal action, shall include this submittal in the O&M manual and may order the equipment submitted on.
   2. REVIEWED AS NOTED: Contractor shall submit a letter verifying that required exceptions to the submittal have been received and complied with including additional accessories or coordination action as noted, and shall include this submittal and compliance letter in the O&M manual. The contractor may order the equipment submitted on at the time of the returned submittal providing the Contractor complies with the exceptions noted.
   3. NOT APPROVED: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is not approved. The Contractor will automatically be required to furnish the product, material or method named in the Specifications and/or Drawings. Contractor shall not order equipment that is not approved. Repetitive requests for substitutions will not be considered.
   4. REVISE AND RESUBMIT: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is marked revise and resubmit. The Contractor will automatically be required to furnish the product, material or method named in the Specifications and/or provide as noted on previous shop drawings. Contractor shall not order equipment marked revise and resubmit. Repetitive requests for substitutions will not be considered.
   5. CONTRACTOR'S CERTIFICATION REQUIRED: Contractor shall resubmit submittal on material, equipment or method of installation. The Contractor's stamp is required stating that the submittal meets all conditions of the Contract Documents. The stamp shall be signed by the General Contractor. The submittal will not be reviewed if the stamp is not placed and signed on all shop drawings.
   6. MANUFACTURER NOT AS SPECIFIED: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is marked manufacturer not as specified. The Contractor will automatically be required to furnish the product, material or method named in the Specifications. Contractor shall not order equipment when submittal is marked manufacturer not as specified. Repetitive requests for substitutions will not be considered.

F. Materials and equipment which are purchased or installed without submittal review shall be at the risk of the Contractor and the cost for removal and replacement of such materials and equipment and related work which is judged unsatisfactory by the Owner or Engineer for any reason shall be at the expense of the Contractor. The responsible Contractor shall remove the material and equipment noted above and replace with specified equipment or material at his own expense when directed in writing by the Architect or Engineer.

G. Shop Drawing Submittals shall be complete and checked prior to submission to the Engineer for review.

H. Submittals are required for, but not limited to, the following items subject to project requirements:
   1. Coordination Drawings
   2. Common Motor Requirements for HVAC Equipment
   3. Expansion Fittings and Loops for HVAC Piping
   4. Hangers and Support for Piping and Equipment HVAC
   5. Vibration and Seismic Controls for HVAC Piping and Equipment
   6. Testing, Adjusting, and Balancing
   7. Duct Insulation
   8. HVAC Equipment Insulation
   9. HVAC Piping Insulation
   10. Energy Management and Control System
   11. Above Ground Hydronic Piping
   12. Refrigerant Piping
   13. Metal Ductwork
   14. Ductwork Accessories
   15. HVAC Fans
   16. Air Distribution Devices
   17. Air Filters
   18. Rooftop Heating and Cooling Units Electric Cooling-Electric Heat
   19. Split System Air-Conditioners - Wall-Mounted

I. Refer to other Division 23 sections for additional submittal requirements. Provide samples of actual materials and/or equipment to be used on the Project upon request of the Owner or Engineer.

1.15 COORDINATION DRAWINGS

A. Prepare coordination drawings to a scale of 1/4"=1'-0" or larger; detailing major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access, and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:
   1. Indicate the proposed locations of pipe, duct, equipment, and other materials. Include the following:
      a. Wall and type locations.
      b. Clearances for installing and maintaining insulation.
      c. Locations of light fixtures and sprinkler heads.
      d. Clearances for servicing and maintaining equipment, including tube removal, filter removal, and space for equipment disassembly required for periodic maintenance.
      e. Equipment connections and support details.

f. Exterior wall and foundation penetrations.
g. Routing of storm and sanitary sewer piping.
h. Fire-rated wall and floor penetrations.
i. Sizes and location of required concrete pads and bases.
j. Valve stem movement.
k. Structural floor, wall and roof opening sizes and details.

2. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
3. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
4. Prepare reflected ceiling plans to coordinate and integrate installations, air distribution devices, light fixtures, communication systems components, and other ceiling-mounted items.

B. This Contractor shall be responsible for coordination of all items that will affect the installation of the work of this Division. This coordination shall include, but not be limited to: voltage, ampacity, capacity, electrical and piping connections, space requirements, sequence of construction, building requirements and special conditions.

C. By submitting coordination drawings on the project, this Contractor is indicating that all necessary coordination has been completed and that the systems, products and equipment submitted can be installed in the building and will operate as specified and intended, in full coordination with all other Contractors and Subcontractors.

1.16 RECORD DOCUMENTS

A. Prepare Record Documents in accordance with the requirements of Division 00 and Division 01, in addition to the requirements specified in Division 23.

B. The Contractor shall maintain a separate set of clearly and legibly marked Record Drawings on the job site to record all changes and modifications, including, but not limited to the following: work details, alterations to meet site conditions, and changes made by "Change Order" notices. Mark the drawings with colored pencil(s). These shall be available for review by the Owner, Architect or Engineer during the entire construction stage.

C. The Record Drawings shall be updated concurrently as construction progresses, and in no case less frequently than a daily basis. They shall indicate accurate dimensions for all buried or concealed work, precise locations of all concealed pipe or duct, locations of all concealed valves, controls and devices and any deviations from the work shown on the Construction Documents. All dimensions shall include at least two dimensions to permanent structure points.

D. Record Drawings shall indicate, at a minimum, the following installed conditions:
1. Duct mains and branches, size and location, for both exterior and interior; locations of dampers, fire dampers, duct access panels, and other control devices; filters, fuel fired heaters, fan coils, condensing units, and roof-top A/C units requiring periodic maintenance or repair.
2. Mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, expansion compensators, tanks, etc.). Valve location diagrams, complete with valve tag chart. Indicate actual inverts and horizontal locations of underground piping.
3. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
4. Approved substitutions, Contract Modifications, and actual equipment and materials installed.

5. Contract Modifications, actual equipment and materials installed.

E. Engage the services of a Land Surveyor or Professional Engineer registered in the state in which the project is located as specified herein to record the locations and invert elevations of underground installations.

F. If the Contractor does not keep an accurate set of Record Drawings, the pay request may be altered or delayed at the request of the Architect. Delivery of Record Documents is a condition of final acceptance. Record Drawings shall be furnished in addition to Shop Drawings.

G. The Contractor shall submit an electronic copy of the record documents in PDF format and one (1) full size set of Record Drawing prints to the Architect or Engineer for review prior to scheduling the final inspection at the completion of the work. The drawings shall have the name(s) and seal(s) of the Engineer(s) removed or blanked out and shall be clearly marked and signed on each sheet as follows:

CERTIFIED RECORD DRAWINGS

DATE:

(NAME OF GENERAL CONTRACTOR)

BY: _____

(SIGNATURE)

(NAME OF SUBCONTRACTOR)

BY: _____

(SIGNATURE)

1.17 OPERATING AND MAINTENANCE MANUALS

A. Prepare operating and maintenance manuals in accordance with Division 00 and Division 01 and, in addition to the requirements specified in those Divisions, include the following information for equipment items:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
    a. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
    b. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
    c. Servicing instructions and lubrication charts and schedules.

1.18 CERTIFICATIONS AND TEST REPORTS

A. Submit a detailed schedule for completion and testing of each system indicating scheduled dates for completion of system installation and outlining tests to be performed and scheduled date for each test. This detailed completion and test schedule shall be submitted at least 90 days before the projected substantial completion date.

B. Test result reporting forms shall be submitted for review no later than the date of the detailed schedule.

C. Submit 4 copies of all certifications and test reports to the Architect or Engineer for review adequately in advance of substantial completion of the Work to allow for remedial action as required to correct deficiencies discovered in equipment and systems.

D. Certifications and test reports to be submitted shall include, but not be limited to, those items outlined in Section 23 02 00.

1.19 OPERATING AND MAINTENANCE MANUALS

A. Prepare Operations and Maintenance manuals in accordance with the requirements of Division 01 and Division 23. In addition to the requirements of other Sections, this shall include the following information for equipment items:
   1. Identifying names, name tags designations and locations for all equipment.
   2. Valve tag lists with valve number, type, color coding, location and function.
   3. Reviewed Shop Drawing submittals with exceptions noted compliance letter.
   4. Fabrication drawings.
   5. Equipment and device bulletins and data sheets clearly highlighted to show equipment installed on the project and including performance curves and data as applicable, i.e., description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and model numbers of replacement parts.
   6. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
   7. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
   8. Servicing instructions and lubrication charts and schedules.
   9. Equipment and motor name plate data.
   10. Wiring diagrams.
   11. Exploded parts views and parts lists for all equipment and devices.
   12. Color coding charts for all painted equipment and conduit.
   13. Location and listing of all spare parts and special keys and tools furnished to the Owner.
   14. Furnish recommended lubrication schedule for all required lubrication points with listing of type and approximate amount of lubricant required.

B. Coordinate with Division 01 for Operations and Maintenance manual requirements. Unless noted otherwise, bind together in “D ring” style three-ring binders (National model no. 79-883 or equivalent). Binders shall be large enough to allow ¼” of spare capacity. Include three (3) sets with all approved Shop Drawing submittals, fabrication drawings, bulletins, maintenance instructions, operating instructions and parts exploded views and lists for each and every piece of equipment furnished under this Specification. All sections shall be typed and indexed into sections with tabbed insertable dividers, labeled for easy reference. Utilize the individual specification section numbers shown in the Mechanical Specifications as an organization guideline. Bulletins containing information about equipment that is not installed on the project shall be properly marked up or stripped and reassembled. All pertinent information required by the Owner for proper operation and maintenance of equipment supplied by Division 23 shall be clearly and legibly set forth in memoranda that shall, likewise, be bound with bulletins.

C. In addition to the bound “hard-copy” Operation and Maintenance manuals referenced above, provide an identical electronic copy in searchable PDF format, with all sections bookmarked within the file for easy reference. Provide a USB flash drive with the final manual to the Owner.

D. Operating and Maintenance Manuals shall be turned over to the Owner or Engineer for review a minimum of fourteen (14) working days prior to the beginning of the operator training period.

E. Operating and Maintenance Manuals which the Engineer deems incomplete, poorly organized, or otherwise unacceptable will be rejected in writing. The Contractor will subsequently be required to again turn over Operating and Maintenance Manuals, with all deficiencies corrected, until deemed acceptable by the Engineer.

1.20 OPERATOR TRAINING

A. The Contractor shall furnish the services of factory trained specialists to instruct the Owner's operating personnel. The Owner's operator training shall include a minimum of 12 hours of onsite training in three (3) shifts of four (4) hours each.

B. Before proceeding with the instruction of Owner Personnel, prepare a typed outline in triplicate, listing the subjects that will be covered in this instruction, and submit the outline for review by the Owner. At the conclusion of the instruction period, obtain the signature of each person being instructed on each copy of the reviewed outline to signify that he has a proper understanding of the operation and maintenance of the systems and resubmit the signed outlines.

C. Refer to other Division 23 Sections for additional Operator Training requirements.

1.21 FINAL COMPLETION

A. At the completion of the Work, all equipment and systems shall be tested and faulty equipment and material shall be repaired or replaced. Refer to Sections of Division 23 for additional requirements.

B. Clean and adjust all air distribution devices and replace all air filters immediately prior to Substantial Completion.

C. Touch up and/or refinish all scratched equipment and devices immediately prior to Substantial Completion.

1.22 CONTRACTOR'S GUARANTEE

A. Use of the HVAC systems to provide temporary service during construction period will not be allowed without permission from the Owner in writing; and, if granted, shall not cause the warranty period to start, except as defined below.

B. Contractor shall guarantee to keep the entire installation in repair and perfect working order for a period of one year after the date of the Substantial Completion, and shall furnish (free of additional cost to the Owner) all materials and labor necessary to comply with the above guarantee throughout the year beginning from the date of Substantial Completion, Beneficial Occupancy by the Owner, or the Certificate of Final Payment as agreed upon by all parties.

C. This guarantee shall not include cleaning or changing filters except as required by testing, adjusting and balancing.

D. All air conditioning compressors shall have parts and labor guarantees provided by the equipment manufacturer for a period of not less than 5 years beyond the date of Substantial Completion.

E. Refer to Sections in Division 23 for additional guarantee or warranty requirements.

1.23 TRANSFER OF ELECTRONIC FILES

A. Project documents are not intended or represented to be suitable for reuse by Architect/Owner or others on extensions of this project or on any other project. Any such reuse or modification without written verification or adaptation by Engineer, as appropriate for the specific purpose intended, will be at Architect/Owner’s risk and without liability or legal exposure to Engineer or its consultants from all claims, damages, losses and expense, including attorney’s fees arising out of or resulting thereof.

B. Because data stored in electronic media format can deteriorate or be modified inadvertently, or otherwise, without authorization of the data’s creator, the party receiving the electronic files agrees that it will perform acceptance tests or procedures within sixty (60) days of receipt, after which time the receiving party shall be deemed to have accepted the data thus transferred to be acceptable. Any errors detected within the sixty (60) day acceptance period will be corrected by the party delivering the electronic files. Engineer is not responsible for maintaining documents stored in electronic media format after acceptance by the Architect/Owner.

C. When transferring documents in electronic media format, Engineer makes no representations as to the long term compatibility, usability or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by Engineer at the beginning of the Project.

D. Any reuse or modifications will be at the Contractor’s sole risk and without liability or legal exposure to Architect, Engineer or any consultant.

E. The Texas Board of Architectural Examiners (TBAE) has stated that it is in violation of Texas law for persons other than the Architect of record to revise the Architectural drawings without the Architect’s written consent.

1. It is agreed that “MEP” hard copy or computer-generated documents will not be issued to any other party except directly to the Architect/Owner. The Contract Documents are contractually copyrighted and cannot be used for any other project or purpose except as specifically indicated in AIA B-141 Standard Form of Agreement Between Architect and Owner.
2. If the client, Architect or Owner of the project requires electronic media for “record purposes”, then AutoCAD/ Revit documents will be prepared by Engineer on electronic media such as removable memory devices, flash drives or CD’s. These documents can also be submitted via file transfer protocols. AutoCAD/ Revit files will be submitted with all title block references intact to permit the end user to only view and plot the drawings. Revisions will not be permitted in this configuration.
3. At the Architect/Owner’s request, Engineer will assist the Contractor in the preparation of the submittals and prepare one copy of AutoCAD/ Revit files on electronic media or submit through file transfer protocols. The electronic media will be prepared with all indicia of documents ownership removed. The electronic media will be prepared in a “.rvt” or “.dwg” format to permit the end user to revise the drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide materials and equipment manufactured by a domestic United States manufacturer and assembled in the United States for all local and Federal Government projects. These materials and equipment shall comply with “Buy American Act.”

B. Access Doors: Provide access doors as required for access to equipment, valves, controls, cleanouts and other apparatus where concealed. Access doors shall have concealed hinges and screw driver cam locks.

C. All access doors located in wet areas such as restrooms, locker rooms, shower rooms, kitchen and any other wet areas shall be constructed of stainless steel.

D. Access Doors: shall be as follows:
   1. Plaster Surfaces: Milcor Style K.
   2. Ceramic Tile Surface: Milcor Style M.
   3. Drywall Surfaces: Milcor Style DW.
   4. Install doors only in locations approved by the Architect.

2.2 EQUIPMENT PADS

A. Provide 6-inch-high concrete pads for indoor floor mounted equipment. Pads shall conform to the shape of the equipment with a minimum extension of 6 inch beyond the equipment on all sides. Top and sides of pads shall be troweled to a smooth finish, equivalent to the floor. External corners shall be bullnosed to a 3/4" radius, unless shown otherwise.

B. Provide 6-inch-high concrete pads for all exterior mounted equipment. Pads shall conform to the shape of the equipment with a minimum extension of 6 inch beyond the equipment on all sides. Provide a 4-foot monolithic extension to the pad in front of the equipment for service when mounted on a non-finished area (i.e. landscape, gravel, clay, etc.) Top and sides of pads shall be troweled to a smooth finish. External corners shall be bullnosed to a 3/4" radius, unless shown otherwise.

PART 3 - EXECUTION

3.1 ROUGH-IN

A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected via reviewed submittals.

B. Refer to equipment specifications in Divisions 2 through 48 for additional rough-in requirements.

3.2 MECHANICAL INSTALLATIONS

A. General: Sequence, coordinate, and integrate the various elements of mechanical systems, materials, and equipment. Comply with the following requirements:
   1. Coordinate mechanical systems, equipment, and materials installation with other building components.
   2. Verify all dimensions by field measurements.
   3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for mechanical installations.
   4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
   5. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
   6. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
   7. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
   8. Install systems, materials, and equipment to conform with architectural action markings on submittal, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, resolve conflicts and submit proposed solution to the Architect for review.
   9. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
   10. Install mechanical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as possible, connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location and label.
   11. Install access doors where units are concealed behind finished surfaces. Refer to paragraph 2.1 in this section and architect for access doors specifications and location.
   12. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.
   13. Provide roof curbs for all roof mounted equipment. Coordinate with roof construction for pitched roof. Provide roof curbs which match the roof slope and provides a level top for equipment installation. Refer to Architectural drawings and details.

14. The equipment to be furnished under these Specifications shall be essentially the standard product of the manufacturer. Where two or more units of the same class of equipment are required, these units shall be products of a single manufacturer; however, the component parts of the system need not be the product of the same manufacturer.
15. The Architectural and Structural features of the building and the space limitations shall be considered in selection of all equipment. No equipment shall be furnished which will not suit the arrangement and space limitations indicated.
16. Lubrication: Prior to start-up, check and properly lubricate all bearings as recommended by the manufacturer.
17. Where the word "Concealed" is used in these Specifications in connection with insulating, painting, piping, ducts, etc., it shall be understood to mean hidden from sight as in chases, furred spaces or suspended ceilings. "Exposed" shall be understood to mean the opposite of concealed.
18. Identification of Mechanical Equipment:
    a. Mechanical equipment shall be identified by means of nameplates permanently attached to the equipment. Nameplates shall be engraved laminated plastic or etched metal. Submittals shall include dimensions and lettering format for approval. Attachment shall be with escutcheon pins, self-tapping screws, or machine screws.
    b. Tags shall be attached to all valves, including control valves, with nonferrous chain. Tags shall be brass and at least 1-1/2 inches in diameter. Nameplate and tag symbols shall correspond to the identification symbols on the temperature control submittal and the "as-built" drawings.
19. Provide construction filters for all air handling units, fan coil unit, VAV boxes, and all other air handling equipment during the entire construction period.
20. Provide temporary construction strains for all strainers in the hydronic systems during the initial flushing of the systems.

3.3 CUTTING AND PATCHING

A. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.

B. Perform cutting, fitting, and patching of mechanical equipment and materials required to:
    1. Uncover Work to provide for installation of ill-timed Work.
    2. Remove and replace defective Work.
    3. Remove and replace Work not conforming to requirements of the Contract Documents.
    4. Remove samples of installed Work as specified for testing.
    5. Install equipment and materials in existing structures.
    6. Upon written instructions from the Engineer, uncover and restore Work to provide for Engineer/Owner's observation of concealed Work, without additional cost to the Owner.
    7. Patch existing finished surfaces and building components using new materials matching existing materials and experienced Installers. Patch finished surfaces and building components using new materials specified for the original installation and experienced Installers; refer to the materials and methods required for the surface and building components being patched; Refer to Paragraph 1.11 I for definition of "Installer."

C. Cut, remove and legally dispose of selected mechanical equipment, components, and materials as indicated, including but not limited to removal of mechanical piping, mechanical ducts and HVAC units, and other mechanical items made obsolete by the new Work.

D. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

E. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

3.4 WORK SEQUENCE, TIMING, COORDINATION WITH OWNER, ARCHITECT AND ENGINEER

A. The Owner will cooperate with the Contractor, however, the following provisions must be observed:
   1. A meeting will be held at the project site, prior to any construction, between the Owner's Representative, the General Contractor, the Sub-Contractors and the Engineer to discuss Contractor's employee parking space, access, storage of equipment or materials, and use of the Owner's facilities or utilities. The Owner's decisions regarding such matters shall be final.
   2. During the construction of this project, normal facility activities will continue in existing buildings until renovated areas are completed. Plumbing, fire protection, lighting, electrical, communications, heating, air conditioning, and ventilation systems shall be maintained in service within the occupied spaces of the existing building.
   3. Contractor shall not start-up any of the HVAC equipment unless the Owner, Architect and Engineer are signed off.
   4. Start-up for major HVAC equipment such as chillers, cooling towers, variable frequency drives and hot water boilers shall be performed by a factory technician. The start-up shall include a written report signed off by Contractor, Engineer and Owner.

3.5 DEMOLITION AND WORK WITHIN EXISTING BUILDINGS

A. In the preparation of these documents every effort has been made to show the approximate locations of, and connections to, the existing piping, duct, equipment and other apparatus related to this phase of the Work. However, this Contractor shall be responsible for verifying all of the above information. This Contractor shall visit the existing site to inspect the facilities and related areas. This Contractor shall inspect and verify all details and requirements of all the Contract Documents, prior to the submission of a proposal. All discrepancies between the Contract Documents and actual job-site conditions shall be resolved by the contractor, who shall produce drawings that shall be submitted to the Architect/Engineer for review. All labor and materials required to perform the work described shall be a part of this Contract.

B. All equipment and/or systems noted on the Drawings "To Remain" shall be inspected and tested on site to certify its working condition. A written report on the condition of all equipment to remain, including a copy of the test results and recommended remedial actions and costs shall be made by this Contractor to the Architect/Engineer for review.

C. All equipment and/or systems noted on the Drawings "To Be Removed" shall be removed including, associated pipe and duct, pipe and duct hangers and/or line supports. Where duct or pipe is to be capped for future or end of line use, it shall be properly tagged with its function or service appropriately identified. Where existing equipment is to be removed or relocated and has an electric motor or connection, the Electrical Contractor shall disconnect motor or connection, remove wiring to a safe point and this Contractor shall remove or relocate motor or connection along with the equipment.

D. During construction and remodeling, portions of the Project shall remain in service. Construction equipment, material, tools, extension cords, etc., shall be arranged so as to present minimum hazard or interruption to the occupants of the building. None of the construction work shall interfere with the proper operation of the existing facility; or be so conducted as to cause harm or danger to persons on the premises. All fire exits, stairs or corridors required for proper access, circulation or exit shall remain clear of equipment, materials or debris. The General Contractor shall maintain barricades, other separations in corridors and other spaces where work is conducted.

E. Certain work during the demolition and construction phases may require overtime or night time shifts or temporary evacuation of the occupants. Coordinate and schedule all proposed down time with the Owner at least seventy-two (72) hours in advance in writing.

F. Any salvageable equipment as determined by the Owner, shall be delivered to the Owner, and placed in storage at the location of his choice. All other debris shall be removed from the site immediately.

G. Equipment, piping or other potential hazards to the occupants of the building shall not be left overnight outside of the designated working or construction area.

H. Make every effort to minimize damage to the existing building and the Owner's property. Repair, patch or replace as required any damage that occurs as a result of work at the site. Care shall be taken to minimize interference with the Owner's activities during construction and to keep construction disrupted areas to a minimum. Coordinate with the Owner and other trades in scheduling and performance of the work.

I. Include in the contract price all rerouting of existing pipe, duct, etc., and the reconnecting of the existing equipment as necessitated by field conditions to allow the installation of the new systems regardless of whether or not such rerouting, reconnecting or relocating is shown on the Drawings. Furnish all temporary pipe, duct, controls, etc., as required to maintain heating, cooling, and ventilation services for the existing areas with a minimum of interruption.

J. All existing pipe, duct, materials, equipment, controls and appurtenances not included in the remodel or alteration areas are to remain in place.

K. Pipe, duct, equipment and controls serving mechanical and other Owner's equipment, etc., which is to remain but is served by pipe, duct, equipment and controls that are disturbed by the remodeling work, shall be reconnected in such a manner as to leave this equipment in proper operating condition.

L. No portion of the fire protection systems shall be turned off, modified or changed in any way without the express knowledge and written permission of the Owner’s representative in order to protect systems that shall remain in service.

M. It is the intention of this Section of the Specifications to outline minimum requirements to furnish the Owner with a turn-key and operating system in cooperation with other trades with a minimum of disruption or downtime.

N. Refer to Architectural Demolition and/or Alteration plans for actual location of walls, ceilings, etc., being removed and/or remodeled.

END OF SECTION 23 02 00

SECTION 23 02 01 - COORDINATION DRAWINGS

PART 1 - GENERAL

1.1 COORDINATION DRAWINGS

A. The Contractor shall take the lead in coordinating the Mechanical, Electrical, Plumbing, Communications, Electronic Safety/Security and Fire Protection systems within the building.

B. The Contractor shall coordinate a three-dimensional (3D) model of the building which includes the Mechanical, Electrical, Plumbing, and Fire Protection systems. The Contractor will be provided with the REVIT model that was used to generate the contract documents, this file may be used as the background file. The Contractor shall replace the systems drawn with the actual shop drawing models. The Contractor is not limited to using REVIT and may use any 3D software in generating and combining the coordination model.

C. Submitting the contract drawings as coordination drawings will not be acceptable.

D. The model shall include detailed and accurate representations of all equipment to be installed based upon the reviewed equipment submittals.

E. The Contractor shall hold a 3-D coordination meeting with all sub-contractors present to review the model and discuss coordination of the installation of the building systems.

F. Upon completion of the coordination meeting, the Contractor shall submit the 3-D model and 1/4” scale drawings for review.

G. The model shall detail major elements, components, and systems in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:

H. Indicate the proposed locations of pipe, duct, equipment, and other materials. Include the following:
   1. Wall and type locations.
   2. Clearances for installing and maintaining insulation.
   3. Locations of light fixtures and sprinkler heads.
   4. Clearances for servicing and maintaining equipment, including tube removal, filter removal, and space for equipment disassembly required for periodic maintenance.
   5. Equipment connections and support details.
   6. Exterior wall and foundation penetrations.
   7. Routing of storm and sanitary sewer piping.
   8. Fire-rated wall and floor penetrations.
   9. Sizes and location of required concrete pads and bases.
   10. Valve stem movement.
   11. Structural floor, wall and roof opening sizes and details.

I. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.

J. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.

K. Prepare reflected ceiling plans to coordinate and integrate installations, air distribution devices, light fixtures, communication systems components, and other ceiling-mounted items.

L. Sequence of Coordination - Below is hierarchy of model elements and the sequencing by which the models will be coordinated.
   1. Structural and Architectural model
   2. Miscellaneous steel
   3. Perform preliminary space allocation
   4. Identify hard constraints (locations of access panels, lights, A/V space requirements, etc.)
   5. Main and medium pressure ducts from the shaft out
   6. Main graded plumbing lines and vents
   7. Sprinkler mains and branches
   8. Cold and hot water mains and branches
   9. Lighting fixtures and plumbing fixtures
   10. Smaller sized ducts and flex ducts
   11. Smaller size cold water and hot water piping, flex ducts, etc.

M. The Contractor shall not install any item until the coordination has been completed and reviewed by the Construction Manager, Owner, and A/E team.

N. The Contractor shall be responsible for coordination of all items that will affect the installation of the work. This coordination shall include, but not be limited to: voltage, ampacity, capacity, electrical and piping connections, space requirements, sequence of construction, building requirements and special conditions.

O. By submitting shop drawings on the project, the Contractor is indicating that all necessary coordination has been completed and that the systems, products and equipment submitted can be installed in the building and will operate as specified and intended, in full coordination with all trades.

END OF SECTION 23 02 01

SECTION 23 03 00 - MECHANICAL DEMOLITION FOR REMODELING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Mechanical demolition.

B. The Drawings do not show all demolition work required. The Contractor shall make himself familiar with the required scope of work to accomplish the work required by these documents. All demolition work implied or required shall be included in the scope of this contract.

C. Utility service outages required by the new installation will be permitted but only at a time approved by the Owner. The Contractor shall allow the Owner 2 weeks in order to schedule required outages. The time allowed for outages will not be during normal working hours unless otherwise approved by the Owner. All costs of outages, including overtime charges, shall be included in the contract amount.

1.2 WORK SEQUENCE, TIMING, COORDINATION WITH OWNER

A. The Owner will cooperate with the Contractor; however, the following provisions must be observed:
   1. During the construction of this project, normal facility activities will continue in existing buildings until new buildings or renovated areas are completed. Plumbing, fire protection, lighting, electrical, communications, heating, air conditioning, and ventilation systems shall be maintained in service within the occupied spaces of the existing building.
   2. A meeting will be held at the project site, prior to any construction, between the Owner's Representative, the General Contractor, the Subcontractors and Sub-subcontractors, and the Engineer to discuss Contractor's employee parking space, access, storage of equipment or materials, and use of the Owner's facilities or utilities. The Owner's decisions regarding such matters shall be final.

1.3 DEMOLITION AND WORK WITHIN EXISTING BUILDINGS

A. In the preparation of these documents every effort has been made to show the approximate locations of, and connections to the existing piping, duct, equipment and other apparatus related to this phase of the Work. However, this Contractor shall be responsible for verifying all of the above information. This Contractor shall visit the existing site to inspect the facilities and related areas. This Contractor shall inspect and verify all details and requirements of all the Contract Documents, prior to the submission of a proposal. All discrepancies between the Contract Documents and actual job-site conditions shall be resolved by the contractor, who shall produce drawings which shall be submitted to the Architect/Engineer for review. All labor and materials required to perform the work described shall be a part of this Contract.

B. All equipment and/or systems noted on the Drawings "To Remain" shall be inspected and tested on site to certify its working condition. A written report on the condition of all equipment to remain, including a copy of the test results and recommended remedial actions and costs shall be made by this Contractor to the Architect/Engineer for review.

C. All equipment and/or systems noted on the Drawings "To Be Removed" should be removed including, associated pipe and duct, pipe and duct hangers and/or line supports. Where duct or pipe is to be capped for future or end of line use, it shall be properly tagged with its function or service appropriately identified. Where existing equipment is to be removed or relocated and has an electric motor or connection, the Electrical Contractor shall disconnect motor or connection, remove wiring to a safe point and this Contractor shall remove or relocate motor or connection along with the equipment.

D. During construction and remodeling, portions of the Project shall remain in service. Construction equipment, material, tools, extension cords, etc., shall be arranged so as to present minimum hazard or interruption to the occupants of the building. None of the construction work shall interfere with the proper operation of the existing facility; or be so conducted as to cause harm or danger to persons on the premises. All fire exits, stairs or corridors required for proper access, circulation or exit shall remain clear of equipment, materials or debris. The General Contractor shall maintain barricades, other separations in corridors and other spaces where work is conducted.

E. Certain work during the demolition and construction phases may require overtime or night time shifts or temporary evacuation of the occupants. Coordinate and schedule all proposed down time with the Owner at least seventy-two (72) hours in advance in writing.

F. Any salvageable equipment as determined by the Owner, shall be delivered to the Owner, and placed in storage at the location of his choice. All other debris shall be removed from the site immediately.

G. Equipment, piping or other potential hazards to the occupants of the building shall not be left overnight outside of the designated working or construction area.

H. Make every effort to minimize damage to the existing building and the Owner's property. Repair, patch or replace as required any damage which occurs as a result of work at the site. Care shall be taken to minimize interference with the Owner's activities during construction and to keep construction disrupted areas to a minimum. Coordinate with the Owner and other trades in scheduling and performance of the work.

I. Include in the contract price all rerouting of existing pipe, duct, etc., and the reconnecting of the existing equipment as necessitated by field conditions to allow the installation of the new systems regardless of whether or not such rerouting, reconnecting or relocating is shown on the drawings. Furnish all temporary pipe, duct, controls, etc., as required to maintain heating, cooling, and ventilation services for the existing areas with a minimum of interruption.

J. All existing pipe, duct, materials, equipment, controls and appurtenances not included in the remodel or alteration areas are to remain in place.

K. Pipe, duct, equipment and controls serving mechanical and other Owner's equipment, etc., which is to remain but which is served by pipe, duct, equipment and controls that are disturbed by the remodeling work, shall be reconnected in such a manner as to leave this equipment in proper operating condition.

L. No portion of the fire protection systems shall be turned off, modified or changed in any way without the express knowledge and written permission of the Owner's representative in order to protect systems that shall remain in service.

M. It is the intention of this Section of the Specifications to outline minimum requirements to furnish the Owner with a turn-key and operating system in cooperation with other trades with a minimum of disruption or downtime.

N. Refer to Architectural Demolition and/or Alteration plans for actual location of walls, ceilings, etc., being removed and/or remodeled.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Field verify measurements, and piping arrangements are as shown on Drawings.

B. Verify that abandoned piping and equipment serve only abandoned facilities.

C. Demolition Drawings are based on casual field observation and existing Record Documents. Report discrepancies to Architect and Engineer before disturbing existing installation.

D. Beginning of demolition means that the contractor accepts existing conditions.

3.2 PREPARATION

A. Disconnect mechanical systems in walls, floors, and ceilings scheduled for removal.

B. Coordinate utility service outages with Utility Company.

C. Provide temporary connections, if required, to maintain existing systems in service during construction. When work must be performed on energized equipment, use personnel experienced in such operations.

D. Existing Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Obtain permission from Owner at least 24 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.

E. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections. Notify Owner and local fire service at least 24 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.

3.3 DEMOLITION AND EXTENSION OF EXISTING MECHANICAL WORK

A. Demolish and extend existing mechanical work under provisions of Division 02 and this Section.

B. Remove, relocate, and extend existing systems to accommodate new construction.

C. Remove abandoned piping to source of supply.

D. Remove exposed abandoned piping systems, including abandoned systems above accessible ceiling finishes. Cut systems flush with walls and floors, and patch surfaces.

E. Repair adjacent construction and finishes damaged during demolition and extension work.

F. Maintain access to existing systems which remain active. Modify installation or provide access doors as appropriate.

G. Extend existing systems using materials and methods compatible with existing systems, or as specified.

3.4 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment which remain or are to be reused.

3.5 INSTALLATION

A. Install relocated materials and equipment under the provisions of Division 02.

3.6 REMOVAL OF MATERIALS

A. The Contractor shall modify, remove, and/or relocate all materials and items so indicated on the Drawings or required by the installation of new facilities. All removals and/or dismantling shall be conducted in a manner as to produce maximum salvage. Salvage materials shall remain the property of the Owner, and shall be delivered to such destination as directed by the Owner. Materials and/or items scheduled for relocation and which are damaged during dismantling or reassembly operations shall be repaired and restored to good operating condition. The Contractor may, at his discretion and upon the approval of the Owner, substitute new materials and/or items of like design and quality in lieu of materials and/or items to be relocated.

B. All items which are to be relocated shall be carefully removed in reverse to original assembly or placement and protected until relocated. The contractor shall clean and repair and provide all new materials, fittings, and appurtenances required to complete the relocations and to restore to good operative order. All relocations shall be performed by workmen skilled in the work and in accordance with standard practice of the trades involved.

C. When items scheduled for relocation are found to be in damaged condition before work has been started on dismantling, the Contractor shall call the attention of the Owner to such items and receive further instructions before removal. Items damaged in repositioning operations are the Contractor's responsibility and shall be repaired or replaced by the Contractor as approved by the Owner, at no additional cost to the Owner.

D. Service lines and wiring to items to be removed, salvaged, or relocated shall be removed to points indicated on the Drawings, specified, or acceptable to the Owner. Service lines and wiring not scheduled for reuse shall be removed to the points at which reuse is to be continued or service is to remain. Such services shall be sealed, capped, or otherwise tied-off or disconnected in a safe manner acceptable to the Owner. All disconnections or connections into the existing facilities shall be done in such a manner as to result in minimum interruption of services to adjacent occupied areas. Services to existing areas or facilities which must remain in operation during the construction period shall not be interrupted without prior specific approval of the Owner as hereinbefore specified.

E. Certain work during the demolition and construction phases may require overtime or nighttime shifts or temporary evacuation of the occupants. Coordinate and schedule all proposed down time with the Owner's Representative at least 72 hours in advance in writing.

F. Make every effort to minimize damage to the existing building and the Owner's property. Repair, patch, or replace as required any damage which occurs as a result of work at the site. Care shall be taken to minimize interference with the Owner's activities during construction. Cooperate with the Owner and other trades in scheduling and performance of the work.

G. The Contractor shall be responsible for loss or damage to the existing facilities caused by him and his workmen, and shall be responsible for repairing such loss or damage. The Contractor shall send proper notices, make necessary arrangements, and perform other services required for the care, protection and in-service maintenance of all electrical services for the new and existing facilities. The Contractor shall erect temporary barricades, with necessary safety devices, as required to protect personnel from injury, removing all such temporary protection upon completion of the work.

H. Where existing construction is removed to provide working and extension access to existing utilities, Contractor shall remove doors, piping, conduit, outlet boxes, wiring, light fixtures, air conditioning ductwork and equipment, etc., to provide this access and shall reinstall same upon completion of work in the areas affected.

I. Where partitions, walls, floors, or ceilings of existing construction are being removed, all contractors shall remove and reinstall in locations approved by the Architect all devices required for the operation of the various systems installed in the existing construction.

END OF SECTION 23 03 00

SECTION 23 05 13 - COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. Section 23 02 00 - Basic Materials and Methods for HVAC shall be included as a part of this Section as though written in full in this document.

1.2 SCOPE

A. Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for owner's use.

B. WORK SPECIFIED ELSEWHERE:
   1. Painting
   2. Automatic temperature controls
   3. Power control wiring to motors and equipment

1.3 WARRANTY

A. Warrant the Work specified herein for one year and motors for five years beginning on the date of substantial completion.

1.4 REFERENCE STANDARDS

A. IEEE 112 - IEEE Standard Test Procedure for Polyphase Induction Motors and Generators; 2017.

B. NEMA MG 00001 - Motors and Generators; 2024.

1.5 SUBMITTALS

A. SHOP DRAWINGS: Indicate size material, and finish. Show locations and installation procedures. Include details of joints, attachments, and clearances.

B. PRODUCT DATA: Submit schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures variations, and accessories.

C. MOTOR NAMEPLATE INFORMATION: Manufacturer's name, address, utility and operating data.

D. Refer to Division One for additional information.

1.6 DELIVERY AND STORAGE

A. DELIVERY: Deliver clearly labeled, undamaged materials in the manufacturers' unopened containers.

B. TIME AND COORDINATION: Deliver materials to allow for minimum storage time at the project site. Coordinate delivery with the scheduled time of installation.

C. STORAGE: Store materials in a clean, dry location, protected from weather and abuse.

PART 2 - PRODUCTS

2.1 ELECTRIC MOTORS

A. APPROVED MANUFACTURERS: Provide motors by a single manufacturer as much as possible.
   1. Baldor
   2. Marathon
   3. Siemens-Allis
   4. General Electric
   5. U.S. Motor

B. TEMPERATURE RATING: Provide insulation as follows:
   1. CLASS B: 104 degrees F maximum.
   2. CLASS F:
      a. Between 104 degrees F and 149 degrees F maximum.
      b. Totally enclosed motors.

C. STARTING CAPABILITY: As required for service indicated five starts minimum per hour.

D. PHASES AND CURRENT: Verify electrical service compatibility with motors to be used.
   1. UP TO 3/4 HP: Provide electronically commutated brushless DC single phase motors with built-in inverter and microprocessor-based control.
   2. 1 HP AND LARGER: Provide squirrel-cage AC induction polyphase motors.
   3. Name plate voltage shall be the same as the circuit's nominal voltage, serving the motor.

E. SERVICE FACTOR: 1.15 for polyphase; 1.35 for single phase.

F. FRAMES: U-frames 1.5 hp. and larger.

G. BEARINGS: Provide sealed re-greaseable ball bearings; with top mounted Zerk lubrication fittings and bottom side drains minimum average life 100,000 hours typically, and others as follows:
   1. Design for thrust where applicable.
   2. PERMANENTLY SEALED: Where not accessible for greasing.
   3. SLEEVE-TYPE WITH OIL CUPS: Light duty fractional hp. motors or polyphase requiring minimum noise level.

H. ENCLOSURE TYPE: Provide enclosures as follows, except where otherwise indicated:
   1. CONCEALED INDOOR: ODP (Open Drip Proof).
   2. EXPOSED INDOOR: Guard Protected.
   3. OUTDOOR TYPICAL: Type II. TEFC.
   4. OUTDOOR WEATHER PROTECTED: Type I. WPI.
   5. EXPLOSION PROOF, XP: For use in hazardous locations.

I. OVERLOAD PROTECTION: Built-in sensing device for stopping motor in all phase legs and signaling where indicated for fractional horse power motors.

J. NOISE RATING: "Quiet" except where otherwise indicated.

K. All motors that are to be operated by a variable frequency drive shall be inverter duty rated motors.

L. All motors operated by variable frequency drive shall be equipped with a maintenance free, conductive microfiber, shaft grounding ring with a minimum of two rows of circumferential microfibers to discharge electrical shaft currents within the motor and/or its bearings.

M. EFFICIENCY: Minimum full load efficiency listed in the following table, when tested in accordance with IEEE 112, Method B, including stray load loss measure.

NEMA MG 00001 Efficiency - 1800 RPM Synchronous Speed		
Motor horsepower	Index Letter	Minimum Efficiency
3 - 5	G	89.5
7.5	G	91.0
10	F	91.7
15 - 20	E	93.0
25 - 30	E	93.6
40	D	94.1
50	C	95.0
60	C	95.0
75	C	95.0
100 - 125	B	95.4
150 - 200	B	95.8

NEMA MG 00001 Efficiency - 1200 RPM Synchronous Speed		
Motor horsepower	Index Letter	Minimum Efficiency
3 - 5	G	89.5
7.5	G	90.2
10	F	91.7
15	F	91.7
20	E	92.4
25 - 30	E	93.6
40 - 50	D	94.1
60	D	94.5
75	C	94.5
100 - 125	C	95.0
150 - 200	B	95.4

2.2 MOTOR CONTROLLERS (STARTERS)

A. All motor controllers (for equipment furnished under Division 23) shall be furnished under Division 23 and installed under Division 26 unless otherwise noted on the plans.
   1. Starters shall be provided for 3 phase motors 1 horsepower and greater.

B. Motor starters shall be furnished as follows.
   1. GENERAL: Motor starters shall be Square D Company Class 8536 across-the-line magnetic type, full-voltage, non-reversing (FAVOR) starter. All starters shall be constructed and tested in accordance with the latest NEMA standards, sizes and horsepower. ICE sizes are not acceptable. Starters shall be mounted in a general purpose dead front, painted steel enclosure and surface-mounted. Provide size and number of poles as shown and required by equipment served. Provide two speed, two winding or two speed, single winding motor starter as required for two speed motors.
   2. CONTACTS: Magnetic starter contacts shall be double break solid silver alloy. All contacts shall be replaceable without removing power wiring or removing starter from panel. The starter shall have straight-through wiring.
   3. OPERATING COILS: Operating coils shall be 120 volts and shall be of molded construction. When the coil fails, the starter shall open and shall not lock in the closed position.
   4. OVERLOAD RELAYS: Provide manual reset, trip-free Class 20 overload relays in each phase conductor in of all starters. Overload relays shall be melting alloy type with visual trip indication. All 3 phase and single phase starters shall have one overload relay in each underground conductor. Relay shall not be field adjustable from manual to automatic reset. Provide 6 overload relays for two speed motor starters.
   5. PILOT LIGHTS: Provide a red running pilot light for all motor starters. Pilot lights shall be mounted in the starter enclosure cover. Pilot lights shall be operated from an interlock on the motor starter and shall not be wired across the operating coil.
   6. CONTROLS: Provide starters with HAND-OFF-AUTOMATIC switches. Coordinate additional motor starter controls with the requirements of Division 23. Motor starter controls shall be mounted in the starter enclosure cover.

7. CONTROL POWER TRANSFORMER: Provide a single-phase 480 volt control power transformer with each starter for 120 volt control power. Connect the primary side to the line side of the motor starter. The primary side shall be protected by a fuse for each conductor. The secondary side shall have one leg fused and one leg grounded. Arrange transformer terminals so that wiring to terminals will not be located above the transformer.
8. AUXILIARY CONTACTS: Each starter shall have one normally open and one normally closed convertible auxiliary contact in addition to the number of contacts required for the "holding interlock", remote monitoring, and control wiring. In addition, it shall be possible to field-install three more additional auxiliary contacts without removing existing wiring or removing the starter from its enclosure.
9. UNIT WIRING: Unit shall be completely pre-wired to terminals to eliminate any interior field wiring except for line and load power wiring and HVAC control wiring.
10. ENCLOSURES: All motor starter enclosures shall be NEMA 1, general purpose enclosures or NEMA-3R if mounted exposed to high moisture conditions. Provide NEMA 4X when located by cooling towers.
11. POWER MONITOR: Provide a square "D" 8430 MPS phase failure and under-voltage relay, base and wiring required for starters serving all 3 phase motors. Set the under-voltage setting according to minimum voltage required for the motor to operate within its range.

C. APPROVED MANUFACTURERS: Controller numbers are based on first named manufacturer. Provide one of the following manufacturer's.
1. Siemens.
2. Square D.
3. General Electric.
4. Eaton.

2.3 COMBINATION MOTOR STARTERS

A. GENERAL: Combination motor starters shall consist of a magnetic starter and a fusible or non-fusible disconnect switch in a dead front, painted steel NEMA 1 enclosure unless otherwise noted and shall be surface-mounted. Size and number of poles shall as shown and required by equipment served. Combination motor starters shall be as specified for motor starters in Paragraph 2.02-B, except as modified herein.

B. APPROVED MANUFACTURERS: Controller numbers are based on first named manufacturer. Provide one of the following manufacturer's.
1. Siemens.
2. Square D.
3. General Electric.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All equipment shall be installed in accordance with the manufacturers' recommendations and printed installation instructions.

B. All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Contractors' price shall include all items required as per manufacturers' requirements.

C. Install in a professional manner. Any part or parts not meeting this requirement shall be replaced or rebuilt without extra expense to Owner.

D. Install rotating equipment in static and dynamic balance.

E. Provide foundations, supports, and isolators properly adjusted to allow minimum vibration transmission within the building.

F. Correct objectionable noise or vibration transmission in order to operate equipment satisfactorily as determined by the Engineer.

END OF SECTION 23 05 13

SECTION 23 05 29 - HANGERS AND SUPPORTS FOR PIPING AND EQUIPMENT - HVAC

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. Section 23 02 00 - Basic Materials and Methods for HVAC shall be included as a part of this Section as though written in full in this document.

1.2 WORK INCLUDED

A. Pipe, and equipment hangers, supports and associated anchors.

B. Sleeves and seals.

C. Flashing and sealing equipment and pipe stacks.

1.3 RELATED WORK

A. Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment

B. Section 23 07 19 - HVAC Piping Insulation

C. Section 23 21 13 - Above Ground Hydronic Piping

1.4 REFERENCES

A. ASME B31.1 - Power Piping; 2024.

B. ASME B31.9 - Building Services Piping; 2020.

C. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2018, with Amendment (2019).

1.5 QUALITY ASSURANCE

A. Hangers and Supports for HVAC Piping: In conformance with ASME B31.1 and ASME B31.9.

B. Hangers and Supports for HVAC Piping: In conformance with MSS SP-58.

1.6 SUBMITTALS

A. Submit shop drawings and product data under provisions of Division One.

B. Indicate hanger and support framing and attachment methods.

C. Provide delegated design submittal for equipment anchorage as required in specification 23 02 00 – Part 1.

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

A. Hangers for Pipes Sizes 1/2 to 1-1/2 Inch: Malleable iron, adjustable swivel, split ring.

B. Hangers for Pipes Sizes 2 to 4 Inch: Carbon steel, adjustable clevis.

C. Hangers for Pipes Sizes 6 Inches and Over: Adjustable steel yoke, cast iron roller, double hanger.

D. Multiple or Trapeze Hangers: Steel channels with welded spacers, pre-formed manufactured saddles and hanger rods; cast iron roller and stand for pipe sizes 6 inches and over.

E. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.

F. Wall Support for Pipe Sizes 4 Inches and over: adjustable steel yoke and cast iron roller.

G. Vertical Support: Steel riser clamp.

H. Floor Support for Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, locknut nipple, floor flange, and concrete pier or steel support.

I. Floor Support for Pipe Sizes 6 Inches and Over: Adjustable cast iron roller and stand, steel screws, and concrete pier or steel support.

J. Roof Pipe Supports and Hangers: Galvanized Steel Channel System as manufactured by Portable Pipe Hangers, Inc. or approved equal.
   1. For pipes 2-1/2” and smaller - Type PP10 with roller
   2. For pipes 3” through 8” - Type PS
   3. For multiple pipes - Type PSE - Custom

K. Copper Pipe Support and Hangers: Electro-galvanized with thermoplastic elastomer cushions; Unistrut “Cush-A-Clamp” or equal. Hangers: Plastic coated; Unistrut or equal.

L. Shields for Vertical Copper Pipe Risers: Sheet lead.

M. Pipe Rough-In Supports in Walls/Chases: Provide preformed plastic pipe supports, Sioux Chief “Pipe Titan” or equal.

2.2 HANGER RODS

A. Galvanized Hanger Rods: Threaded both ends, threaded one end, or continuous threaded.

2.3 INSERTS

A. Inserts: Malleable iron case with galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.4 FLASHING

A. Metal Flashing: 20 gage galvanized steel.

B. Lead Flashing: 4 lb. /sq. ft. sheet lead for waterproofing; 1 lb. /sq. ft. sheet lead for soundproofing.

C. Caps: Steel, 20 gage minimum; 16 gage at fire resistant elements.

D. Coordinate with roofing contractor/Architect for type of flashing on metal roofs.

2.5 EQUIPMENT CURBS

A. Fabricate curbs of hot dipped galvanized steel.

B. For metal roof construction, roof curbs shall be made of aluminum or stainless steel. Coordinate with Architectural Drawings and details.

2.6 SLEEVES

A. Sleeves for Pipes through Non-fire Rated Floors: Form with 18 gage galvanized steel, tack welded to form a uniform sleeve.

B. Sleeves for Pipes through Beams, Interior Walls, Exterior Walls, Footings, and Potentially Wet Floors: Form with steel pipe, Schedule 40, galvanized.

C. Sleeves for Pipes through Fire Rated and Fire Resistive Floors and Fireproofing: Prefabricated fire rated steel sleeves including seals, UL listed, manufactured by Hilti.

D. Fire Stopping Insulation: Glass fiber type, non-combustible, UL listed.

E. Caulk: Paintable 25-year acrylic sealant.

F. Pipe Alignment Guides: Factory fabricated, of cast semi-steel or heavy fabricated steel, consisting of bolted, two-section outer cylinder and base with two-section guiding spider that bolts tightly to pipe. Length of guides shall be as recommended by manufacturer to allow indicated travel.

2.7 MECHANICAL SLEEVE SEALS

A. Modular sealing element unit, designed for field assembly, to continuously fill annular space between pipe and sleeve and create watertight seal.
   1. Approved Manufacturers:
      a. Link-Seal by Garlock Pipeline Technologies (GPT)
      b. Innerlynx by Advance Products & Systems, Inc.
      c. MetraSeal by Metraflex Co.
   2. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material, size of pipe, and service requirements.
   3. Pressure Plates: Carbon steel. Include two for each sealing element.
   4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.8 FABRICATION

A. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

B. Design hangers without disengagement of supported pipe.

C. Design roof supports without roof penetrations, flashing or damage to the roofing material.

2.9 FINISH

A. Exposed steel hangers, supports, and appurtenances shall be hot-dipped galvanized. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

PART 3 - EXECUTION

3.1 INSERTS

A. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams. Coordinate with Structural Engineer for placement of inserts.

B. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.

C. Where concrete slabs form finished ceiling, provide inserts to be flush with slab surface.

D. Where inserts are omitted, drill through concrete slab from below and provide thru-bolt with recessed square steel plate and nut recessed into and grouted flush with slab. Verify with Structural Engineer prior to start of work.

3.2 PIPE HANGERS AND SUPPORTS

A. Support horizontal piping as follows:

PIPE SIZE	MAX. HANGER SPACING	HANGER DIAMETER
(Steel Pipe)		
1/2 to 1-1/4 inch	7'-0"	3/8"
1-1/2 to 3 inch	10'-0"	3/8"
4 to 6 inch	10'-0"	1/2"
8 to 10 inch	10'-0"	5/8"
12 to 14 inch	10'-0"	3/4"
15 inch and over	10'-0"	7/8"
(Copper Pipe)		
1/2 to 1-1/4 inch	5'-0"	3/8"
1-1/2 to 2-1/2 inch	8'-0"	3/8"
3 to 4 inch	10'-0"	3/8"
6 to 8 inch	10'-0"	1/2"
(Cast Iron Pipe)		
2 to 3 inch	5'-0"	3/8"
4 to 6 inch	10'-0"	1/2"
8 to 10 inch	10'-0"	5/8"
12 to 14 inch	10'-0"	3/4"
15 inch and over	10'-0"	7/8"
(PVC Pipe)		
1-1/2 to 4 inch	4'-0"	3/8"
6 to 8 inch	4'-0"	1/2"

10 inch and over	4'-0"	5/8"

B. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.

C. Place a hanger within 12 inches of each horizontal elbow, and at the vertical to horizontal transition.

D. Use hangers with 1-1/2 inch minimum vertical adjustment.

E. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.

F. Support vertical piping at every floor.

G. For vertical shaft or chase applications where floor slab supported riser clamps cannot be provided to keep the pipe in alignment and to support the weight of the pipe and its contents, ensure to provide suitable fasteners, hardware, braces, unistrut, structural steel members, and appurtenances required to accommodate the pipe installation. Coordinate all such work with the project structural engineer to ensure that necessary members and attachment points are provided accordingly to bear the weight of the functioning piping.

H. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

I. Support riser piping independently of connected horizontal piping.

J. Install hangers with nut at base and above hanger; tighten upper nut to hanger after final installation adjustments.

K. Portable pipe hanger systems shall be installed per manufacturer’s instructions.

L. Distances between supports are maximum distance. Supports shall be provided to carry the pipe/equipment load.

3.3 INSULATED PIPING

A. Clamps: Attach galvanized clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ASME B31.9.

B. Saddles: Install galvanized protection saddles MSS Type 39 where insulation without vapor barrier is indicated. Fill interior voids with segments of insulation that match adjoining pipe insulation. Secure the full contact area of the saddle to the pipe insulation with 1/8” thick coat of mastic.

C. Shields: Install protective shields MSS SP-58 Type 40 on cold and chilled water piping that has vapor barrier. Secure the full contact area of the shield to the pipe insulation with 1/8” thick coat of mastic.

D. Shields shall span an arc of 180 degrees and shall have dimensions in inches not less than the following:

Nominal Pipe Size	Shield Length	GaugeThickness
1/4 through 3-1/2 inch	12	18
4 inch	12	16

5 through 6 inch	18	16
8 through 14 inch	24	14
16 through 24 inch	24	12

E. Piping 2” and larger: provide galvanized sheet metal shields with calcium silicate insulation at hangers/supports.

F. Insert material shall be at least as long as the protective shield.

G. Thermal Hanger Shields: Install where indicated, with insulation of same thickness as piping.

3.4 FLASHING

A. Provide flexible flashing and metal counter flashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.

B. Provide curbs for mechanical roof installations that extend minimum 8 inches above adjacent roofing surface. Contact Architect for all flashing details and roof construction. Seal penetrations watertight.

3.5 SLEEVES

A. Sleeves shall be provided at the following locations:
1. Piping passing through rated and non-rated floor assemblies, rated ceiling assemblies, and roof assemblies.
2. Piping passing through concrete, masonry, and rated gypsum board walls and partitions.
3. Piping passing through exterior wall assemblies above and below grade.
4. Piping passing through non-rated gypsum board walls and partitions where indicated on the drawings or where exposed to view.
5. Piping passing through structural members where indicated on the drawings or where exposed to view.
6. Any other locations indicated on the drawings.

B. Set sleeves in position in formwork. Provide reinforcing around sleeves.

C. Extend sleeves through floors minimum one inch above finished floor level. Sleeves located in walls, ceilings, and structural members shall be flush with the outer surfaces of the assembly being penetrated.

D. Where sleeved piping penetrates a floor, ceiling, or interior wall assembly, pack annular space between pipe and sleeve with UL listed fire stopping insulation and caulk seal airtight with fire barrier sealant. Provide close fitting metal collar or escutcheon covers at both sides of wall penetrations and exposed side of ceiling penetrations.

E. Install all UL listed, prefabricated fire rated steel sleeves per the manufacturer’s installation instructions to ensure fire rating is maintained.

F. Sleeves at exterior walls below grade shall be sealed with mechanical sleeve seal. Install seal per manufacturer's installation instructions. Select type and number of sealing elements required for pipe material, pipe size, and service requirements. Position pipe in center of sleeve. Assemble mechanical sleeve seal and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal. Locations above grade shall be provided with close fitting metal collar or escutcheon covers at both sides of penetration.

END OF SECTION 23 05 29

SECTION 23 05 48 - VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. Section 23 02 00 - Basic Materials and Methods for HVAC shall be included as a part of this Section as though written in full in this document.

1.2 WORK INCLUDED

A. Vibration and sound control products.

1.3 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of vibration control products of type, size, and capacity required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Vibration and sound control products shall conform to ASHRAE criteria for average noise criteria curves for all equipment at full load conditions.

C. Unless otherwise indicated, sound and vibration control products shall be provided by a single manufacturer.

1.4 SUBMITTALS

A. SHOP DRAWINGS: Indicate size, material, and finish. Show locations and installation procedures. Include details of joints, attachments, and clearances.

B. PRODUCT DATA: Submit schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, product variations, and accessories.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. VMC Group

B. Mason Industries, Inc.

C. Kinetics Noise Control, Inc.

D. Vibration Eliminator Co., Inc.

2.2 GENERAL

A. Provide vibration isolation supports for equipment, piping and ductwork, to prevent transmission of vibration and noise to the building structure that may cause discomfort to the occupants.

B. Model numbers of VMC Group products are included for identification. Products of the listed manufacturers will be acceptable provided they comply with all the requirements of this specification.

2.3 SUSPENDED FANS AND FAN COIL UNITS

A. Provide VMC Group model HS spring hangers sized for 1'' static deflection.

2.4 CONDENSING UNITS

A. Provide VMC Group model NRC, 1" thick ribbed elastomeric isolation pads sized for approximately 40 psi loading and 1/8'' deflection.

B. Pads shall be located in accordance with the condensing unit manufacturer's recommendations.

2.5 PIPING

A. Provide VMC Group model HRS combination spring and elastomeric isolation hangers in mechanical equipment rooms, for a minimum distance of 50 feet from isolated equipment for all chilled water and hot water piping 1-1/2'' diameter and larger. Isolators shall be sized for the same deflection as the isolators specified for the equipment up to a maximum of 2" deflection for at least the first three piping hangers; the remaining hangers shall have isolators sized for 1" deflection.

B. Floor supported piping is required to be isolated with VMC Group model AW-1 open springs sized for 1'' deflection.

C. All condenser water piping shall be supported with VMC Group model AW-1 open springs sized for 1" deflection for floor or roof mounted piping and VMC Group model HRS-1 combination spring and elastomeric isolation hangers sized for 1" deflection for suspended piping.

D. Provide line size flexible connectors at supply and return of pumps, chillers, and all other locations indicated on the mechanical drawings and details. Flexible pipe connectors shall be VMC Group model 2800 single sphere EPDM construction and shall include 150 lb. cadmium plated carbon steel floating flanges.

2.6 CORROSION PROTECTION

A. All vibration isolators shall be designed and treated for resistance to corrosion.

B. Steel components: PVC coated or phosphate coated and painted with industrial grade enamel. Nuts, bolts, and washers: zinc-electroplated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All equipment shall be installed in accordance with the manufacturer's recommendations and printed installation instructions.

B. All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items required as per manufacturer's requirements.

C. If internal isolation option is used on air handling units, the mechanical contractor shall verify proper adjustment and operation of isolators prior to start-up. All shipping brackets and temporary restraint devices shall be removed.

D. The vibration isolation supplier shall certify in writing that he has inspected the installation and that all external isolation materials and devices are installed correctly and functioning properly.

END OF SECTION 23 05 48

SECTION 23 05 53 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. Section 23 02 00 - Basic Materials and Methods for HVAC shall be included as a part of this Section as though written in full in this document.

1.2 SCOPE

A. Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for owner's use.

B. Refer to Architectural Sections for additional requirements.

PART 2 - PRODUCTS

2.1 EQUIPMENT IDENTIFICATION

A. Mechanical equipment shall be identified by means of nameplates permanently attached to the equipment. Nameplates shall be engraved laminated plastic or etched metal with minimum 1/2 inch high letters manufactured by Seton Company or approved equal. Submittals shall include dimensions and lettering format for approval. Attachment shall be with escutcheon pins, self-tapping screws, or machine screws and shall be permanently accessible and visible.
   1. At a minimum, equipment nameplates shall include: Equipment tag, manufacturer, model number, serial number, and design capacity.

2.2 ACCESS PANEL AND ACCESS DOOR MARKERS

A. 1/16 inch thick, engraved laminated plastic, with abbreviated terms and numbers corresponding to identification for equipment being accessed. Access locations for fire dampers, smoke dampers, and combination fire/smoke dampers located above ceiling shall have red text with 1/2 inch high letters reading: FIRE/SMOKE DAMPER, SMOKE DAMPER, or FIRE DAMPER to identify the damper type that is accessible at that location.

B. Install access panel markers with screws on equipment access panels.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All labeling equipment shall be installed as per manufacturer’s printed installation instructions.

B. All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Contractors price shall include all items required as per manufacturer’s requirements.

C. All piping shall be cleaned of rust, dirt, oil and all other contaminants prior to painting. Refer to Division 9 for Architect's required paint system(s).

END OF SECTION 23 05 53

SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. Section 23 02 00 - Basic Materials and Methods for HVAC shall be included as a part of this Section as though written in full in this document.

1.2 RELATED DOCUMENTS

A. Approved submittal date on equipment installed, to accomplish the test procedures, outlined under paragraph 3.01 of this Section, will be provided by the Contractor.

1.3 DESCRIPTION

A. The TAB of the air conditioning systems shall be performed by an impartial technical firm hired by the Owner whose operations are limited only to the field of professional TAB. The TAB work will be done under the direct supervision of a qualified engineer employed by the TAB firm.

B. The TAB firm will be responsible for inspecting, adjusting, balancing, and logging the date on the performance of fans, dampers in the duct system, and air distribution devices. The Contractor and the various Subcontractors of the equipment installed shall cooperate with the TAB firm to furnish necessary data on the design and proper applications of the system components and provide labor and material required to eliminate deficiencies or malperformance.

1.4 QUALITY ASSURANCE

A. QUALIFICATIONS OF CONTRACTOR PERSONNEL: Submit evidence to show that the personnel who shall be in charge of correcting deficiencies for balancing the systems are qualified. The Owner and Engineer reserve the right to require that the originally approved personnel be replaced with other qualified personnel if, in the Owner and Engineer's opinion, the original personnel are not qualified to properly place the system in condition for balancing.

B. QUALIFICATIONS OF TAB FIRM PERSONNEL:
   1. A minimum of one registered Professional Engineer licensed in the State, is required to be in permanent employment of the firm.
   2. Personnel used on the jobsite shall be either Professional Engineers or technicians, who shall have been permanent, full time employees of the firm for a minimum of six months prior to the start of Work for that specified project.
   3. Evidence shall be submitted to show that the personnel who actually balance the systems are qualified. Evidence showing that the personnel have passed the tests required by the Associated Air Balance Council (AABC) shall be required.

C. CALIBRATION LIST: Submit to the Engineer for approval, a list of the gauges, thermometers, velometer, and other balancing devices to be used in balancing the system. Submit evidence to show that the balancing devices are properly calibrated before proceeding with system balancing.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 SERVICES OF THE CONTRACTOR

A. The Drawings and Specifications have indicated valves, dampers, and miscellaneous adjustment devices for the purpose of adjustment to obtain optimum operating conditions. Install these devices in a manner that leaves them accessible, and provide access as requested by the TAB firm.

B. Have systems complete and in operational readiness prior to notifying the TAB firm that the project is ready for their services, and certify in writing to the Architect and Owner that such a condition exists.

C. As a part of the Work of this Section, make changes in the sheaves, belts, and dampers or the addition of dampers required for correct balance of the new work as required by the TAB firm, at no additional cost to the Owner.

D. Fully examine the existing system to be balanced, to determine whether or not sufficient volume dampers, balancing valves, thermometers, gauges, pressure and temperature taps, means of reading static pressure and total pressure in duct systems, means of determining water flow, and other means of taking data needed for proper water and air balancing are existing. Submit to the Engineer in writing a listing of omitted items considered necessary to balance existing systems. Submit the list and proposal as a cost add item.

E. Verify that fresh air louvers are free of blockage, coils are clean and fresh air ducts to each air handling unit have individually adjustable volume regulating dampers.

F. Provide, correct, repair, or replace deficient items or conditions found during the testing, adjusting, and balancing period.

G. In order that systems may be properly tested, balanced, and adjusted as specified, operate the systems at no expense to the Owner for the length of time necessary to properly verify their completion and readiness for TAB period.

H. Project construction schedules shall provide time to permit the successful completion of TAB services prior to Substantial Completion. Complete, operational readiness, prior to commencement of TAB services, shall include the following services of the Contractor:
   1. Construction status of building shall permit the closing of doors, windows, ceilings installed and penetrations complete, to obtain project operating conditions.
   2. AIR DISTRIBUTION SYSTEMS:
      a. Verify installation for conformity to design. Supply, return, and exhaust ducts terminated and pressure tested for leakage as specified.
      b. Volume and fire dampers properly located and functional. Dampers serving requirements of minimum and maximum outside air, return and relief shall provide tight closure and full opening, smooth and free operation.
      c. Supply, return, exhaust and transfer grilles, registers and diffusers shall be installed.
      d. Air handling systems, units and associated apparatus, such as heating and cooling coils, filter sections, access doors, etc., shall be blanked and sealed to eliminate excessive bypass or leakage of air.

e. Fans (supply and exhaust) operating and verified for freedom from vibrations, proper fan rotation and belt tension; overload heater elements shall be of proper size and rating; record motor amperage and voltage and verify that these functions do not exceed nameplate ratings.
f. Furnish or revise fan drives or motors as necessary to attain the specified air volumes.

3. AUTOMATIC CONTROLS:
   a. Verify that control components are installed in accordance with project documents and functional, electrical interlocks, damper sequences, air and water resets, fire and freeze stats.
   b. Controlling instruments shall be functional and set for design operating conditions. Factory precalibration of room thermostats and pneumatic equipment will not be acceptable.
   c. The temperature regulation shall be adjusted for proper relationship between the controlling instruments and calibrated by the TAB Contractor. Advise Engineer of deficiencies or malfunctions.

I. Contractor shall repair any insulation removed from piping system by TAB Contractor during water balancing.

3.2 SERVICES OF THE TAB FIRM

A. The TAB firm will act as liaison between the Owner, Engineer, and the Contractor and inspect the installation of mechanical piping system, sheet metal work, temperature controls and other component parts of the heating, air conditioning and ventilating systems being retrofitted, repaired, or added under this Contract. The reinspection of the Work will cover that part related to proper arrangement and adequate provision for the testing and balancing and will be done when the Work is 80 percent complete.

B. Upon completion of the installation and start-up of the mechanical equipment, to check, adjust, and balance system components to obtain optimum conditions in each conditioned space in the building. Prepare and submit to the Engineer complete reports on the balance and operations of the systems.

C. Measurements and recorded readings of air, water, and electricity that appear in the reports will be done by the permanently employed technicians or engineers of the TAB firm.

D. Make an inspection in the building during the opposite season from that in which the initial adjustments were made. At the time, make necessary modifications to the initial adjustments required to produce optimum operation of system components to affect the proper conditions as indicated on the Drawings. At time of opposite season check-out, the Owner's representative will be notified before readings or adjustments are made.

E. In fan systems, the air quantities indicated on the Drawings may be varied as required to secure a maximum temperature variation of two degrees within each separately controlled space, but the total air quantity indicated for each zone must be obtained. It shall be the obligation of the Contractor to furnish or revise fan drive and motors if necessary, without cost to the Owner, to attain the specified air volumes.

F. Contractor shall utilize ultrasonic flow meter to balance water flow of existing water system if the original pressure drop data is not available. Contractor shall remove insulation as necessary to use flow meter.

G. Participate in the commissioning process, which shall include but not be limited to attending commissioning meetings, coordinating work with and completing checklists as required by the commissioning team.

3.3 PROFESSIONAL REPORT

A. Before the final acceptance of the report is made, the TAB firm will furnish the Engineer the following data to be approved by the Owner and Engineer:
   1. Summary of main supply, return and exhaust duct pitot tube traverses and fan settings indicating minimum value required to achieve specified air volumes.
   2. A listing of the measured air quantities at each outlet corresponding to the temperature tabulation as developed by the Engineer and TAB firm.
   3. Air quantities at each return and exhaust air handling device.
   4. Static pressure readings entering and leaving each supply fan, exhaust fan, filter, coil, balancing dampers and other components of the systems. Including the retrofit Work. These readings will be related to performance curves in terms of the CFM handled if available.
   5. Motor current readings at each equipment motor on load side of capacitors. The voltages at the time of the reading shall be listed.
   6. The final report shall certify test methods and instrumentation used, final velocity reading obtained, temperatures, pressure drops, RPM of equipment, amperage of motors, air balancing problems encountered, recommendations and uncompleted punch list items. The test results will be recorded on standard forms.
   7. A summary of actual operating conditions shall be included with each system outlining normal and ventilation cycles of operation. the final report will act as a reference of actual operating conditions for the Owner's operating personnel.

3.4 BALANCING AIR CONDITIONING SYSTEM

A. GENERAL:
   1. Place all equipment into full operation, and continue operating during each working day of balancing and testing. If the air conditioning system is balanced during Off-Peak cooling season Contractor shall return to rebalance air side system as required to put system in proper balance at that season.
   2. The Contractor shall submit detailed balancing and recording forms for approval. After approval by the Engineer, prepare complete set of forms for recording test data on each system. All Work shall be done under the supervision of a Registered Professional Engineer. All instruments used shall be accurately calibrated to within 1% of scale and maintained in good working order.
   3. Upon completion of the balancing and testing, the TAB Contractor shall compile the test data in report forms, and forward five copies to the Engineer for evaluation.
   4. The final report shall contain logged results of all tests, including such data as:
      a. Tabulation of air volume at each outlet.
      b. Outside dry bulb and wet bulb temperature.
      c. Inside dry bulb and wet bulb temperatures in each conditioned space room or area.
      d. Actual fan capacities and static pressures. Motor current and voltage readings at each fan.

B. AIR SYSTEMS: Perform the following operations as applicable to balance and test systems:
   1. Check fan rotation.

2. Check filters (balancing shall be done with clean filters).
3. Test and adjust blower rpm to design requirements.
4. Test and record motor full load amperes.
5. Test and record system static pressures, suction and discharge.
6. Test and adjust system for design cfm, return air and outside air (±2%). Change-out fan sheaves as required to balance system.
7. Test and record entering air temperatures, db and wb.
8. Test and record leaving air temperatures, db and wb.
9. Adjust all zones to design cfm (±2%).
10. Test and adjust each diffuser, grille, and register to within 5% of design.

C. AIR DUCT LEAKAGE: (From SMACNA Duct Standards latest edition) Test all ductwork (designed to handle over 1000 CFM) as follows:
   1. Test apparatus
      a. The test apparatus shall consist of:
      b. A source of high pressure air - a portable rotary blower or a tank type vacuum cleaner.
      c. A flow measuring device consisting of straightening vanes and an orifice plate mounted in a straight tube with properly located pressure taps. Each orifice assembly shall be accurately calibrated with its own calibration curve. Pressure and flow readings shall be taken with U-tube manometers.
   2. Test Procedures
      a. Test for audible leaks as follows:
         1) Close off and seal all openings in the duct section to be tested. Connect the test apparatus to the duct by means of a section of flexible duct.
         2) Start the blower with its control damper closed.
         3) Gradually open the inlet damper until the duct pressure reaches 1.5 times the standard designed duct operating pressure.
         4) Survey all joints for audible leaks. Mark each leak and repair after shutting down blower. Do not apply a retest until sealants have set.
      b. After all audible leaks have been sealed, the remaining leakage should be measured with the orifice section of the test apparatus as follows:
         1) Start blower and open damper until pressure in duct reaches 50% in excess of designed duct operating pressure.
         2) Read the pressure differential across the orifice on manometer No. 2. If there is no leakage, the pressure differential will be zero.
         3) Total allowable leakage shall not exceed one (1) percent of the total system design air flow rate. When partial sections of the duct system are tested, the summation of the leakage for all sections shall not exceed the total allowable leakage.
         4) Even though a system may pass the measured leakage test, a concentration of leakage at one point may result in a noisy leak which must be corrected.

D. DX SYSTEMS:
   1. Test and record suction and discharge pressures at each compressor and record ambient air temperature entering the condensing coils.
   2. Test and record unit full load amps and voltage.
   3. Test and record staging and unloading of unit required by sequence of operation or drawing schedule.

E. Automatic temperature controls shall be calibrated; and all thermostats and dampers adjusted so that the control system is in proper operating condition, subject to the approval of the Engineer/Owner.

F. The TAB Contractor shall report to Engineer all air distribution devices or other equipment that operate noisily so that corrective measures may be implemented by the Contractor at no additional cost to the Owner or Architect/Engineer.

END OF SECTION 23 05 93

SECTION 23 07 13 - DUCT INSULATION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. Section 23 02 00 - Basic Materials and Methods for HVAC shall be included as a part of this Section as though written in full in this document.

1.2 WORK INCLUDED

A. External Duct Insulation
   1. Fiberglass / Glass Mineral Fiber Flexible Blanket Insulation
   2. Fiberglass / Glass Mineral Fiber Rigid Board Insulation
   3. Fiberglass / Glass Mineral Fiber Segmented Board Pipe and Tank Insulation
   4. Fiberglass / Glass Mineral Fiber Continuous Mat Pipe and Tank Insulation
   5. Fire-Rated High-Temperature Ceramic Fiber Flexible Blanket Insulation

B. Internal Duct Insulation
   1. Fiberglass / Glass Mineral Fiber Flexible Duct Liner Insulation
   2. Fiberglass / Glass Mineral Fiber Rigid Plenum Liner Insulation

C. Adhesives

D. Mastics

E. Lagging Adhesives

F. Sealants

G. Glass Fiber Fabric Reinforcing Mesh

H. Securements

1.3 RELATED SECTIONS

A. Section

B. Section 23 05 53 - Identification for HVAC Piping and Equipment

C. Section 23 31 13 - Metal Ductwork

1.4 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2023a.

D. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

E. ASTM C165 - Standard Test Method for Measuring Compressive Properties of Thermal Insulations; 2023.

F. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2019.

G. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation; 2023.

H. ASTM C1290 - Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts; 2016 (Reapproved 2021).

I. ASTM C1393 - Standard Specification for Perpendicularly Oriented Mineral Fiber Roll and Sheet Thermal Insulation for Pipes and Tanks; 2019.

J. ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings; 2019 (Reapproved 2022).

K. ASTM D1644 - Standard Test Methods for Nonvolatile Content of Varnishes; 2001.

L. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2023.

M. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013 (Reapproved 2019).

N. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014 (Reapproved 2019).

O. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation; 2020.

P. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2023a.

Q. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems; 2024.

R. ASTM E2336 - Standard Test Methods for Fire Resistive Grease Duct Enclosure Systems; 2020.

S. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023c.

T. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.

U. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015, with Editorial Revision (2021).

V. ASTM G22 - Standard Practice for Determining Resistance of Plastics to Bacteria; 2023.

W. ICC (IECC) - International Energy Conservation Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

X. MIL-DTL-3316 - Adhesives, Fire-Resistant, Thermal Insulation; 2020d.

Y. NAIMA FGDLS - North American Insulation Manufacturers Association (NAIMA) Fibrous Glass Duct Liner Standards; Current Edition, Including All Revisions.

Z. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

AA. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2024.

BB. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2022).

CC. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

DD. UL 2824 - GREENGUARD Certification Program Method for Measuring Microbial Resistance from Various Sources Using Static Environmental Chambers; Current Edition, Including All Revisions.

EE. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.5 QUALITY ASSURANCE

A. Installer's Qualifications: Firm with at least 5 years successful installation experience on projects with mechanical insulations similar to that required for this project.

B. All insulation shall be listed and labeled to have a composite (insulation, jacket or facing, and adhesive used to adhere the facing or jacket to insulation) flame spread index of not more than 25 and smoke-developed index of not more than 50 when tested in accordance with ASTM E84 and UL 723.
   1. Exception: Outdoor mechanical insulation may have flame spread index of 75 and smoke developed index of 150.

C. Duct and plenum insulation shall comply with minimum R-value requirements of ICC (IECC) and ASHRAE Std 90.1 I-P unless greater values are indicated otherwise in the contract documents.

D. Adhesive and other insulation materials shall comply with NFPA 90A and NFPA 90B. Additionally, all adhesives and sealants used on the interior of the building (i.e., inside of the weatherproofing system and applied on-site) shall be comprised of low-emitting materials that comply with VOC limits prescribed by SCAQMD 1168.

E. Vapor retarder mastics used on the interior of the building shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D

F. Insulations shall not contain formaldehyde, asbestos, lead, mercury, mercury compounds, or polybrominated diphenyl ether fire retardants.

G. Fiberglass insulations shall have a minimum of 50 percent recycled glass content.

H. Fiberglass insulations shall have a formaldehyde-free binder and shall be UL GREENGUARD Gold certified.

1.6 WARRANTY

A. Warrant the Work specified herein for one year against becoming unserviceable or causing an objectionable appearance resulting from either defective, or nonconforming materials and workmanship.

B. Defects shall include, but not be limited to, the following:
   1. Mildewing.
   2. Peeling, cracking, and blistering.
   3. Condensation on exterior surfaces.

1.7 SUBMITTALS

A. SHOP DRAWINGS: Indicate size, material, and finish. Show locations and installation procedures. Include details of joints, attachments, and clearances.

B. PRODUCT DATA: Submit schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, product variations, and accessories.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver insulation materials to site in unopened containers with manufacturer's product name, ASTM standard designation, type and grade, maximum use temperature, nominal dimensions, manufacturer lot or date code.

B. Protect insulation against dirt, water, and chemical and mechanical damage. Do not install damaged or wet insulation; remove such from project site.

PART 2 - PRODUCTS

2.1 GENERAL DESCRIPTION

A. The type of insulation and its installation shall be in strict accordance with these specifications for each service, and the application technique shall be as recommended by the manufacturer. All insulation types, together with adhesives and finishes shall be submitted and approved before any insulation is installed.

B. A sample quantity of each type of insulation and each type of application shall be installed and approval secured prior to proceeding with the main body of the Work.

2.2 ACCEPTABLE MANUFACTURERS

A. Fiberglass/Glass mineral fiber materials shall be as manufactured by Knauf Insulation, Certain-Teed, Johns-Manville or Owens-Corning and shall have the same thermal properties, density, fire rating, vapor retarder, etc., as the types specified herein, subject to review by the Engineer.

B. Adhesives, mastics, and sealants shall be as manufactured by 3M Company, Carlisle/Hardcast, Design Polymerics, Foster/Childers, Mon-Eco Industries, or Vimasco Corporation and shall have the same adhesive properties, fire rating, vapor seal, etc., as the types specified herein, subject to review by the Engineer.

C. Ceramic fiber materials shall be as manufactured by 3M Company, Alkegen/Unifrax, or Morgan Advanced Materials/Thermal Ceramics.

D. Metal jacketing and fitting covers shall be as manufactured by Johns Manville or RPR Products, Inc.

2.3 EXTERNAL INSULATIONS

A. Fiberglass / Glass Mineral Fiber Flexible Blanket Insulation: Glass fibers bonded with a thermosetting resin, complying with ASTM C1290 and ASTM C553, Type I, II, and III. Provide insulation with factory applied FSK vapor retarding facing complying with ASTM C1136, Type I, II, VIII, X. Thermal conductivity (k-value) at 75 degrees F mean temperature shall be 0.27 Btu x in. /h x sq. ft. x degrees F, or less. Maximum service temperature of 250 degrees F with facing, 350 degrees F for unfaced material. Provide Knauf Insulation Atmosphere Duct Wrap with ECOSE Technology, Johns Manville Microlite FSK or approved equal.

B. Fiberglass / Glass Mineral Fiber Rigid Board Insulation: Glass fibers bonded with a thermosetting resin, complying with ASTM C553 Type I, II, III, ASTM C612 Type IA, IB. Provide insulation with factory applied FSK facing vapor retarder facing complying with ASTM C1136, Type I, II. Thermal conductivity (k-value) at 75 degrees F mean temperature shall be 0.24 Btu x in. /h x sq. ft. x degrees F, or less. Maximum service temperature of 450 degrees F. Provide Knauf Insulation Earthwool Insulation Board with ECOSE Technology, Johns Manville 800 Series Spin-Glas or approved equal.

C. Fiberglass / Glass Mineral Fiber Segmented Board Pipe and Tank Insulation: Glass fibers bonded with a thermosetting resin, complying with ASTM C1393, Category 1. Semi-rigid, segmented board in roll form with glass fibers adhered perpendicular to the vapor retarder facing. Provide insulation with factory applied FSK vapor retarder facing complying with ASTM C1136, Type II, IV, X. Compressive strength per ASTM C165 C165, not less than 120 PSF at 10% deformation. Thermal conductivity (k-value) at 100 degrees F mean temperature shall be 0.26 Btu x in. /h x sq. ft. x degrees F, or less. Maximum service temperature of 850 degrees F. Provide Knauf Insulation Earthwool Pipe & Tank Insulation with ECOSE Technology or approved equal.

D. Fiberglass / Glass Mineral Fiber Continuous Mat Pipe and Tank Insulation: Glass fibers bonded with a thermosetting resin, complying with ASTM C1393; Type I, II, IIIA, IIIB Category 2. Semi-rigid, continuous mat in roll form. Provide insulation with factory applied FSK vapor retarder facing complying with ASTM C1136, Type II, IV, X. Compressive strength per ASTM C165, not less than 25 PSF at 10% deformation. Thermal conductivity (k-value) at 100 degrees F mean temperature shall be 0.25 Btu x in. /h x sq. ft. x degrees F, or less. Maximum service temperature of 850 degrees F. Provide Knauf Insulation KwikFlex Pipe & Tank Insulation, Johns Manville Micro-Flex or approved equal.

E. Fire-Rated High-Temperature Ceramic Fiber Flexible Blanket Insulation: High-temperature ceramic fiber blanket thermal insulation encapsulated in a fiberglass reinforced aluminized polyester foil. Fire-rated blanket insulation shall have a nominal thickness of 1-1/2" and a nominal density of 6.0 pcf. Provide 3M Fire Barrier Duct Wrap 615+, Alkegen/Unifrax FyreWrap Elite 1.5, or Morgan Advanced Materials/Thermal Ceramics FireMaster FastWrap XL.

2.4 INTERNAL INSULATIONS

A. Fiberglass / Glass Mineral Fiber Flexible Duct Liner Insulation: Rotary glass fibers bonded with thermosetting resin, complying with ASTM C1071 Type I. Airstream side to have a tightly bonded, black mat finish withstanding maximum rated air velocity of 6,000 ft/minute. Mat finish shall be treated with EPA-registered biocide for use in HVAC systems and verified to be microbially resistant in accordance with ASTM G21, ASTM G22, ASTM C1338, and UL 2824. The outer edges of the Liner shall have a factory applied encapsulating coating. Nominal density shall be 1.5 pcf minimum and when tested in accordance with ASTM C423 (Type A Mounting), shall provide a Noise Reduction Coefficient of 0.70 at 1.0", 0.80 at 1.5", and 0.95 at 2.0" thickness. Maximum service temperature of 250 degrees F. Thermal Conductivity (k-value) at 75 degrees F mean temperature shall be 0.24 Btu x in. /h x sq. ft. x degrees F, or less. Provide Knauf Insulation Atmosphere Duct Liner with ECOSE Technology, Johns Manville Linacoustic RC or approved equal.

B. Fiberglass / Glass Mineral Fiber Rigid Plenum Liner Insulation: Glass fibers bonded with thermosetting resin, complying with ASTM C1071 Type II. Airstream side to have a tightly bonded, black mat finish withstanding maximum rated air velocity of 5,000 ft/minute. Mat finish shall be treated with EPA-registered biocide for use in HVAC systems and verified to be microbially resistant in accordance with ASTM G21 and ASTM C1338. The outer edges of the Liner shall have a factory applied encapsulating coating. Nominal density shall be 3.0 pcf minimum and when tested in accordance with ASTM C423 (Type A Mounting), shall provide a minimum Noise Reduction Coefficient of 0.65 at 1.0", 0.85 at 1.5", at 0.95 at 2.0" thickness. Maximum service temperature of 250 degrees F. Thermal Conductivity (k-value) at 75 degrees F mean temperature shall be 0.23 Btu x in. /h x sq. ft. x degrees F, or less. Provide Knauf Insulation Atmosphere Rigid Plenum Liner with ECOSE Technology, Johns Manville Linacoustic R-300 or approved equal.

2.5 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Fiberglass / Glass Mineral Fiber Adhesive: Comply with MIL-DTL-3316C, Class 2, Grade A. Provide Childers CP-82 or approved equal.

C. Duct Liner Adhesive: Duct Liner adhesives shall comply with ASTM C916.

2.6 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates.

B. Vapor-Retarder Mastic: Water based; suitable for indoor and outdoor use on below ambient services. Water-Vapor Permeance shall be 0.09 perms at 55-mils dry film thickness when tested in accordance with ASTM E96/E96M, Procedure A. Service Temperature Range shall be -20 to +180 degrees F. Solids content shall be 59 percent by volume and 71 percent by weight per ASTM D1644. Provide Childers CP-35 or approved equal.

2.7 LAGGING ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates.

B. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over duct, equipment, and pipe insulation. Service Temperature Range shall be 0 to +180 degrees F. Provide Childers CP-52 or approved equal.

2.8 SEALANTS

A. Materials shall be compatible with insulation materials, jackets, and substrates.

B. FSK and Metal Jacket Flashing Sealants shall be fire and water-resistant, flexible, elastomeric sealants with a service temperature range of -40 to +250 degrees F. Provide Childers CP-76 or approved equal.

C. Fire Barrier Sealant shall be a latex-based, intumescent sealant that dries to form a monolithic firestop seal. Fire barrier sealant shall be firestop tested up to 4 hours in accordance with ASTM E814 and fire resistance tested in accordance with ASTM E1966. Provide 3M CP 25WB+ or approved equal.

2.9 GLASS FIBER FABRIC REINFORCING MESH

A. Woven Glass Fiber Fabric: Approximately 2 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. inch. Provide Childers Chil-Glas No. 10 or approved equal.

2.10 SECUREMENTS

A. Bands
   1. Approved Manufacturers
      a. Childers
      b. PABCO
      c. RPR Products
   2. Stainless Steel: ASTM A240/A240M, Type 304 or Type 316; 0.015 inch thick, 3/4 inch wide with wing or closed seal.
   3. Aluminum: ASTM B209/B209M, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 3/4 inch wide with wing or closed seal.
   4. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.

B. Insulation Pins
   1. Approved Manufacturers
      a. AGM Industries, Inc.
      b. Midwest Fasteners, Inc.
      c. GEMCO

d. Duro-Dyne

2. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch-diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
3. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, minimum 0.106-inch-diameter shank, length to suit depth of insulation indicated.
4. Insulation Retaining Washers: Self-locking washers formed from 0.016 inch thick, galvanized steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches (38 mm) in diameter.

C. Staples
1. Outward-clinching insulation staples, nominal 1/2-inch-wide, stainless steel or Monel.

PART 3 - EXECUTION

3.1 GENERAL

A. To ensure that external fiberglass/glass mineral fiber flexible blanket and rigid board insulation will achieve its highest possible performance and serve its intended purpose, install all mechanical insulation materials and associated accessories in accordance with manufacturer's published instructions and industry practices detailed by the North American Commercial and Industrial Insulation Standards (NACIIS) Manual as published by the Midwest Insulation Contractors Association (MICA).

B. To ensure that internal fiberglass/glass mineral fiber flexible duct and rigid plenum liner insulation will achieve its highest possible performance and serve its intended purpose, install duct liner, plenum liner, and all associated accessories in accordance with manufacturer's published instructions and industry practices detailed by NAIMA FGDLS and SMACNA (DCS).

C. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

D. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces, free of voids throughout the length of, ducts and fittings.

E. All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items required as per manufacturer's requirements.

3.2 DUCT LINER

A. Duct liner shall be kept clean and dry during transportation, storage, installation, and throughout the construction process care should be taken to protect the liner from exposure to the elements or damage from mechanical abuse.

B. Duct liner shall be adhered to the sheet metal with a full coverage of approved adhesive complying with ASTM C916. All exposed leading edges and transverse joints shall be coated with factory-applied or field-applied edge coating, Childers CP-50A HV2 Black or approved equal and shall be neatly butted without gaps. Shop or field cuts shall be liberally coated with an edge coating. All coatings and adhesives shall be designed for duct liner application.

C. Metal nosings shall be securely installed over transversely oriented liner edges facing the airstream at forward discharge and at any point where lined duct is preceded by unlined duct.

D. When velocity exceeds 4,000 fpm (20.3 m/sec), use metal nosing on every leading edge. Nosing may be formed on duct or be channel or zee attached by screws, rivets or welds.

E. Line supply and return ductwork at connection of fan-powered HVAC units to a point of 15 feet upstream and downstream of the equipment, 15 feet downstream of fan powered terminal units, and in return air boots.

F. Duct liner shall be provided as follows:
   1. 1" thick, 1.5 pcf density minimum, with a minimum installed R-value of 4.2 when ducts are located in directly conditioned spaces.
   2. 1 ½" thick, 1.5 pcf density minimum, with a minimum installed R-value of 6.0 when ducts are located in indirectly conditioned spaces such as ceiling plenum space used for return air.
   3. 2" thick, 1.5 pcf density minimum, with a minimum installed R-value of 8.0 when ducts are located in indoor, unconditioned spaces or located outdoors.
   4. 1 ½" thick, 3.0 pcf density minimum, with a minimum R-value of 6.3 for rigid plenum liner applications.

3.3 EXPOSED DUCTWORK LOCATED INDOORS

A. Duct required to be insulated by any section of this specification that is routed exposed in occupied spaces shall be double wall.

B. Duct routed exposed shall be double wall with perforated inner liner and fiberglass/glass mineral fiber insulation. Provide 1" thick insulation when ductwork is located in conditioned spaces and 2" thick in unconditioned spaces, insulation density shall be a minimum of 1.0 pcf. Double wall duct shall be United McGill model Acousti-k27 for round or oval ducts and Rectangular-k27 for rectangular ducts or approved equal.

3.4 AIR DEVICE AND MISCELLANEOUS DUCT INSULATION

A. The backside of all supply air devices shall be insulated with taped and sealed external duct wrap matching the thickness, density, and R-value of the associated duct system.

B. The contractor shall install an additional layer of 1-½ inch thick external fiberglass / glass mineral fiber duct wrap on any portion of the supply air, return air, outside air, or exhaust air system that has condensation forming during any period of operation. The insulation shall be taped and vapor-sealed and located until all evidence of the condensation has been eliminated, at no additional cost to the Owner.

3.5 DRYER VENT DUCT

A. All dryer vent duct routed within an air plenum shall be enclosed within a 1-hour fire rated enclosure.

B. The duct enclosure shall be sealed around the duct at the points of penetration with an approved fire barrier sealant. Refer to Division 7 for further requirements regarding ""Through-Penetration Firestop Systems".

C. The enclosure shall be separated from the duct by at least 3 inches and not more than 12 inches.

D. Cleanout openings at exhaust duct with access openings at the fire rated enclosure and access doors shall be provided at each duct offset and as required for proper operation and maintenance.

E. As an alternate method, the contractor may use two layers of 2-hour Fire-Rated High-Temperature Ceramic Fiber Flexible Blanket Insulation in lieu of the fire rated enclosure, provided that all the following constraints are satisfied:
   1. Duct insulation system shall be tested per ASTM E2336 internal fire testing and have an achieved minimum fire resistance rating of 1 hour.
   2. Product shall be approved by the local Authority Having Jurisdiction (AHJ).
   3. Duct wrap system shall be mechanically attached to the duct using steel banding and/or weld pins per manufacturer's instructions.
   4. Duct wrap system shall be installed in strict accordance with the manufacturer's instructions, including but not limited to zero clearance to combustibles at all locations on the wrap surface.

F. Insulation and all other requirements shall be provided per local codes.

END OF SECTION 23 07 13

SECTION 23 07 19 - HVAC PIPING INSULATION

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. Section 23 02 00 - Basic Materials and Methods for HVAC shall be included as a part of this Section as though written in full in this document.

1.2 SCOPE

A. Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for Owner's use.

B. Furnish and install piping insulation to:
   1. Condensate drain piping.
   2. Refrigerant piping.
   3. All pipes subject to freezing conditions shall be insulated.

C. Work specified elsewhere.
   1. Painting.
   2. Pipe hangers and supports.

D. For insulation purpose piping is defined as the complete piping system including supplies and returns, pipes, valves, automatic control valve bodies, fittings, flanges, strainers, thermometer well, unions, reducing stations, and orifice assemblies.

1.3 RELATED SECTIONS

A. Section 23 05 29 - Hangers and Supports for Piping and Equipment - HVAC

B. Section 23 05 53 - Identification for HVAC Piping and Equipment

C. Section 23 21 13 - Above Ground Hydronic Piping

1.4 REFERENCE STANDARDS

A. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

B. ASTM C1126 - Standard Specification for Faced or Unfaced Rigid Cellular Phenolic Thermal Insulation; 2024.

C. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation; 2023.

D. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2025.

E. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 Degrees C; 2024c.

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023c.

G. ICC (IECC) - International Energy Conservation Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2022).

I. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.5 WARRANTY

A. Warrant the Work specified herein for one year against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials or workmanship.

B. Defects shall include, but not be limited to, the following:
   1. Mildewing.
   2. Peeling, cracking, and blistering.
   3. Condensation on exterior surfaces.

1.6 SUBMITTALS

A. SHOP DRAWINGS: Indicate size, material, and finish. Show locations and installation procedures. Include details of joints, attachments, and clearances.

B. PRODUCT DATA: Submit schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, project variations, and accessories.

1.7 DELIVERY AND STORAGE

A. Deliver insulation, coverings, cements, adhesives, and coatings to site in unopened containers with manufacturer’s stamp, clearly labeled with flame and smoke rating, affixed showing fire hazard indexes of products.

B. Protect insulation against dirt, water and chemical and mechanical damage. Do not install damaged or wet insulation; remove such from project site.

PART 2 - PRODUCTS

2.1 HVAC PIPING INSULATION

A. It is the intent of these specifications to secure superior quality workmanship resulting in an absolutely satisfactory installation of insulation from the standpoint of both function and appearance. Particular attention shall be given to valves, fittings, pumps, etc., requiring low temperature insulation to insure full thickness of insulation and proper application of the vapor seal. All flaps of vapor barrier jackets and/or canvas covering must be neatly and securely smoothed and sealed down.

B. The type of insulation and its installation shall be in strict accordance with these specifications for each service, and the application technique shall be as recommended by the manufacturer. All insulation types, together with adhesives and finishes shall be submitted and reviewed prior to installation.

C. A sample quantity of each type of insulation and each type application shall be installed and accepted prior to proceeding with the main body of the work. Condensation caused by improper installation of insulation shall be corrected by Installing Contractor. Any damage caused by condensation shall be made good at no cost to the Owner or Architect/Engineer.

D. All insulation shall be listed and labeled to have a composite (insulation, jacket or facing, and adhesive used to adhere the facing or jacket to insulation) flame spread index of not more than 25 and smoke-developed index of not more than 50 when tested in accordance with ASTM E84 or UL 723.

E. All HVAC piping insulation shall comply with minimum requirements of ICC (IECC) and ASHRAE Std 90.1 I-P.

F. Accessories, such as adhesives, mastics and cements shall have the same component ratings as listed above. Additionally, all adhesives and sealants used on the interior of the building (i.e., inside of the weatherproofing system and applied on-site) shall be comprised of low-emitting materials that comply with VOC limits prescribed by SCAQMD 1168.

G. All products or their shipping cartons shall have a label affixed, indicating flame and smoke ratings do not exceed the above requirements.

H. Any existing piping located in an air plenum that is comprised of materials that do not comply with the 25/50 flame and smoke rating per ASTM E84 testing requirements shall be provided with a single layer of high-temperature insulation to establish a noncombustible rating per ASTM E136. Insulation products which are approved for such non-compliant combustible piping materials located air plenums shall be 3M Fire Barrier Plenum Wrap 5A+ or Unifrax FyreWrap 0.5 Plenum. Insulation products for this application shall be installed in strict accordance with the manufacturer’s instructions.

2.2 APPROVED MANUFACTURERS

A. Calcium silicate materials shall be as manufactured by Johns Manville.

B. Glass mineral wool materials shall be as manufactured by Knauf Insulation, Johns Manville or Owens-Corning and shall have the same thermal properties, density, fire rating, vapor barrier, etc., as the types specified herein, subject to review by the Engineer. All glass mineral wool insulation shall be UL GREENGUARD Gold certified.

C. Adhesives shall be as manufactured by Childers, Foster, HB Fuller or Armacell, and shall have the same adhesive properties, fire rating, vapor seal, etc., as the types specified herein, subject to review by the Engineer.

D. Flexible elastomeric cellular thermal insulation by Armacell.

E. Phenolic foam insulation shall be as manufactured by Resolco, Inc. (Insul-Phen) or Polyguard (Poly-phen).

F. Metal jacketing and fitting covers shall be as manufactured by Childers or RPR Products.

2.3 MATERIALS

A. CONDENSATE DRAINAGE PIPING: Provide flexible elastomeric cellular thermal insulation in accordance with ASTM C534/C534M, model "Armaflex Ultra", fire rated for use in environmental air plenums; insulation not required when piping is exposed on roof.

B. REFRIGERANT PIPING: Provide flexible elastomeric cellular thermal insulation in accordance with ASTM C534/C534M, model "Armaflex Ultra", fire rated for use in environmental air plenums. Apply manufacturers recommended finish and sealant for exterior applications.

C. METAL JACKETING: Utilize Childers “Strap-On” jacketing. Provide preformed fitting covers for all elbows and tees.

D. ALL SERVICE JACKETING (ASJ+): Vapor retarder jacket for interior applications shall be composed of an aluminum foil layer, reinforced with glass scrim, bonded to a layer of white kraft paper, interleaving with an outer polymer film leaving no paper exposed; complying with ASTM C1136. Vapor retarder jacket for exterior applications shall be composed of a 3-ply composite membrane consisting of a white 0.5 mil polyester film, 1.0 mil aluminum foil, and one 0.5 mil clear polyester film; complying with ASTM C1136.

PART 3 - EXECUTION

3.1 GENERAL

A. All insulation shall be installed in accordance with the manufacturer’s recommendations and printed installation instructions, including high density inserts at all hangers and pipe supports to prevent compression of insulation.

B. All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items required as per manufacturer’s requirements.

C. All heat recovery piping between air conditioning equipment and hydronic or domestic hot water piping shall be insulated per the High Temperature Surfaces Schedule below.

D. All condenser water piping located in a ceiling plenum shall be insulated per the requirements for indoor chilled water piping as indicated in the Low Temperature Surfaces Schedule below.

E. Pipes located outdoors or in tunnels shall be insulated same as concealed piping and shall have a jacket of 0.016 inch thick, smooth aluminum with longitudinal modified Pittsburg Z-Lock seam and 2 inch overlap. Jacketing shall be easily removed and replaced without damage. All insulation butt joints shall be sealed with gray silicone. Galvanized banding is not acceptable.

F. Pipes located outdoors shall be provided with a jacket, minimum 0.016 inch thick, smooth aluminum with longitudinal modified Pittsburg Z-Lock seam and 2 inch overlap and heat trace.

G. Pipes located in crawlspaces, mechanical rooms, and exposed to view in indoor occupied areas shall be insulated and shall have a PVC or metal jacketing. Metal jacketing shall be minimum 0.016 inch thick, smooth aluminum with longitudinal modified Pittsburg Z-Lock seam and 2 inch overlap.

H. All insulated piping located over driveways shall have an aluminum shield permanently banded over insulation to protect it from damage from car antennas.

I. Provide all HVAC piping insulation to comply with the ASHRAE Std 90.1 I-P Minimum Thickness Schedule and as indicated below.
   1. Minimum Insulation Thickness for Low Temperature Surfaces
      a. Condensate drain lines: 1 inch
      b. Refrigerant Piping
         1) 1½“ and smaller: 1 inch
         2) Larger than 1½ inch: 1-½ inch
   2. Minimum Insulation Thickness for High Temperature Surfaces
      a. Refrigerant Piping
         1) 1-½ inch and smaller: 1-½ inch
         2) Larger than 1-½ inch: 2 inch

3.2 FIRE RATED INSULATION

A. All pipe penetrations through walls and concrete floors shall be fire rated by applying Owens Corning Thermafiber in the space between the concrete and the pipe.

B. The penetration shall be additionally sealed by using 3M brand model CP 25 or 303 fire barrier caulk and putty.

C. All fire rating material shall be insulated in accordance with manufacturer's printed instructions.

END OF SECTION 23 07 19

SECTION 23 08 00 - COMMISSIONING OF HVAC SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract Documents, including General and Supplementary Conditions and Division 01 Specifications, apply to this section.

1.2 RELATED SECTIONS:

A. Section 23 09 63 - Energy Management and Control System (EMCS)

1.3 SUMMARY

A. The commissioning of the HVAC system and associated controls shall be performed by an impartial technical firm hired by the owner. The commissioning provider shall be certified under one or more of the following certifications:
   1. CxA - Certified Commissioning Authority - ACG
   2. CBCP - Certified Building Commissioning Professional - AEE
   3. CCP - Certified Commissioning Professional - BCA
   4. CPMP - Certified Process Management Professional - ASHRAE
   5. BSC - Building System Commissioning Certification - NEBB

B. The commissioning provider (Commissioning authority) shall be responsible for leading the entire construction team through the commissioning process including, but not limited to, conducting the commissioning kick-off meeting, preparing the commissioning plan, preparing pre-functional checklists, preparing functional test scripts, participation in functional testing and preparation of required documentation and reports.

1.4 RESPONSIBILITIES

A. Contractor: Responsibilities of the Contractor as related to the Commissioning Process include, but are not limited to the following:
   1. Facilitate coordination of Commissioning work by Commissioning authority.
   2. Attend Commissioning meetings or other meetings called by Commissioning authority to facilitate the Commissioning Process.
   3. Review Functional Performance Test procedures for feasibility, safety, and impact on warranty, and provide Commissioning authority with written comment on same.
   4. Provide all documentation relating to manufacturer’s recommended performance testing of equipment and systems.
   5. Provide Operations & Maintenance data to Commissioning authority for preparation of checklists and training manuals.
   6. Provide Testing and Balancing Report before Functional Testing begins.
   7. Provide As-built drawings and documentation to facilitate Testing.
   8. Assure and facilitate participation and cooperation of Sub Contractors and equipment suppliers as required for the Commissioning Process.
   9. Certify to Commissioning authority that installation work listed in Pre-Functional Checklists has been completed.

10. Install systems and equipment in strict conformance with project specifications, manufacturer's recommended installation procedures, and Pre-Functional Checklists.
11. Provide data concerning performance, installation, and start-up of systems.
12. Provide copy of manufacturers filled-out start-up forms for equipment and systems.
13. Ensure systems have been started and fully checked for proper operation prior to arranging for Testing with Commissioning authority. Prepare and submit to Commissioning authority **written** certification that each piece of equipment and/or system has been started according to manufacturer's recommended procedure, and that system has been tested for compliance with operational requirements.
    a. Contractor shall carry out manufacturer's recommended start-up and testing procedures, regardless of whether or not they are specifically listed in Pre-Functional Checklists.
    b. Contractor is not relieved of obligation for systems/equipment demonstration where performance testing is required by specifications, but a Functional Performance Test is not specifically designated by Commissioning authority.
14. Coordinate with Commissioning authority to determine mutually acceptable date of Functional Performance Tests.
15. Provide qualified personnel to assist and participate in Commissioning.
16. Provide test instruments and communications devices, as prescribed by Commissioning authority, required for carrying out Testing of systems.
17. Proprietary test equipment required by the manufacturer, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate its use, and assist the Test Engineer in the commissioning process. Proprietary test equipment shall become the property of the Owner upon completion of commissioning.
18. Ensure deficiencies found in the Commissioning Issues Log are corrected within the time schedule shown in the Commissioning Plan.
19. Provide Commissioning authority with all submittals, start-up instructions manuals, operating parameters, and other pertinent information related to Commissioning Process. This information shall be routed through Architect.
20. Provide commissioning authority with a certificate of readiness to show systems are ready to schedule functional testing.
21. Prepare and submit to Commissioning authority proposed Training Program outline for each system.
22. Coordinate and provide training of Owner's personnel.
23. Prepare Operation & Maintenance Manuals and As-Built drawings in accordance with specifications; submit copy to Commissioning authority in addition to other contractually required submissions. Revise and resubmit manuals in accordance with Design Professionals and Commissioning authority comments.
24. Commissioning requires participation of this Division Subcontractors to ensure that systems are operating in manner consistent with Contract Documents. All costs associated with the participation of Contractor, Sub-Contractors, Design Professionals, and Equipment Vendors in the Commissioning Process shall be included as part of the Construction Contract.

B. Subcontractors and vendors shall prepare and submit to Commissioning authority proposed Startup procedures to demonstrate proper installation of systems, according to these specifications and checklists prepared by Commissioning authority

1.5 COMMISSIONING PLAN

A. Commissioning Process tasks and activities:
   1. Commissioning kick-off meeting: Conducted by commissioning authority and attended by construction team and design team.
   2. Pre-functional checklists: Prepared by the commissioning authority and filled out by subcontractors performing the work that is applicable.
   3. Site visits to review installation of applicable systems and progress of checklist documentation performed and reported by commissioning authority.
   4. Functional testing: Commissioning authority shall conduct functional testing with assistance of applicable subcontractors and document successful results as well as deficiencies (issues). Functional performance testing shall demonstrate the installation and operation of components, systems, and system-to-system interfacing in accordance with plans and specifications. Testing shall include all modes and sequence of operation, including under full-load, part-load and emergency conditions (including all alarms). Controls system shall be tested to document that control devices, components, equipment and systems are calibrated and adjusted and operate in accordance with the plans and specifications. Sequences shall be functionally tested to document they operate in accordance with plans and specifications.
   5. Preliminary commissioning report: Commissioning authority shall issue a preliminary commissioning report to the owner that has results of the first round of functional testing including deficiencies discovered.
   6. Air and hydronic system balancing: Air and water flow rates shall be measured and adjusted to deliver final flow rates within the tolerances provided in the contract documents. System balancing shall be performed by TAB contractor as specified in 23 05 93 - Testing, Adjusting, And Balancing.
   7. Systems manual: Commissioning authority shall compile the systems manual using submittal data provided by the general contractor and applicable subcontractors.
   8. Final commissioning report: Commissioning authority shall issue final commissioning report documenting the entire process and final results of functional testing. Report shall include final testing and balancing report.

B. Equipment to be tested
   1. Energy Management and Control System:
      a. Graphical User Interface
      b. Automation Software
      c. Field Level Controllers
      d. Field Level Devices
      e. Control Sequences
   2. Air Handling Systems (All AHU and 10% of terminal units)
   3. Service water heating systems (100%)

C. Testing functions and conditions
   1. Energy conservation programs (economizer, optimal start, etc)
   2. Verify shutdown of systems when scheduled.
   3. Calibration of sensors
   4. Testing shall affirm winter and summer design conditions.
   5. Test under full outside air conditions.
   6. Confirm functionality of all specified sequences of operations.
   7. Verify the functionality of all alarms.

D. Performance criteria
   1. Air and water temperatures shall be within tolerances specified in the contract documents.
   2. Space temperatures shall be maintained within 1 degree of specified set points.
   3. Space humidity shall be maintained within 5% of specified levels.

PART 2 - PRODUCTS

2.1 NO PRODUCTS SUPPLIED

PART 3 - EXECUTION

3.1 GENERAL

A. This Division has startup responsibilities and are required to complete sub-systems so COMPLETE SYSTEMS are fully functional. Insuring they meet design requirements of Contract Documents. Commissioning procedures and testing do not relieve or lessen this responsibility or shift this responsibility, in whole or in part, to Commissioning Agent or Owner.

B. Coordinate with other Sub-Contractors and equipment vendors to set aside adequate time to address Pre-Functional Checklists, Functional Performance Tests, Operations & Maintenance Manual creation, Owner Training, and associated coordination meetings.

C. Commissioning authority will also conduct site inspections at critical times and issue Cx Field Reports with observations on installation deficiencies so that they may be issued by Architect as deemed appropriate.

3.2 WORK PRIOR TO COMMISSIONING

A. Complete all phases of the work so the systems can be started, adjusted, balanced, tested, and otherwise tested.

B. See pertinent specification sections in this Division, which outline responsibilities for start-up of equipment with obligations to complete systems, including all sub-systems so that they are fully functional.

C. Assist commissioning authority with all information pertaining to actual equipment and installation as required complete the full commissioning scope.

D. Contractor shall prepare startup procedures to demonstrate compliance with pre-functional checklists, and coordinate scheduling for completion of these checklists.

E. A minimum of 7 days prior to date of system startup, submit to Commissioning authority for review, detailed description of equipment start-up procedures which contractor proposes to perform to demonstrate conformance of systems to specifications and Checklists.

3.3 PARTICIPATION IN COMMISSIONING

A. Attend meetings related to the Commissioning Process; arrange for attendance by personnel and vendors directly involved in the project, prior to testing of their systems.

B. Provide skilled technicians to startup and test all systems, and place systems in complete and fully functioning service in accordance with Contract Documents.

C. Provide skilled technicians, experienced and familiar with systems being commissioned, to assist Commissioning authority in commissioning process.

3.4 WORK TO RESOLVE DEFICIENCIES

A. Complete corrective work in a timely manner to allow expeditious completion of Commissioning Process. If deadlines pass without resolution of identified problems, Owner reserves the right to obtain supplementary services and/or equipment to resolve the problem. Costs thus incurred will be Contractor's responsibility.

3.5 PRE-FUNCTIONAL CHECKLISTS (PFC)

A. Contractor shall complete Pre-Functional Checklists to validate compliance with Contract Documents installation and start-up requirements, for this Division's systems.

B. Refer to commissioning plan for detailed list of equipment to be commissioned.

3.6 FUNCTIONAL PERFORMANCE TESTING (FPT)

A. Contractor, in cooperation with Commissioning Agent, shall conduct Functional Performance Testing to validate compliance with Contract Documents.

B. Provide commissioning authority with a certificate of readiness to show systems are ready to schedule functional testing.

C. Refer to commissioning plan for detailed list of equipment to be commissioned.

D. Assist Commissioning authority in Functional Testing by removing equipment covers, opening access panels, etc. Furnish ladders, flashlights, meters, gauges, or other inspection equipment as necessary.

E. DBR has included a small contingency for limited retesting, however DBR reserves the right to stop testing on a system when the system:
   1. Does not have the correct graphics programmed.
   2. Does not have the correct data trends programmed.
   3. Does not have the correct set points programmed.
   4. Does not have the equipment or system safeties installed and programmed correctly.
   5. The TAB data forms have not been submitted to our firm or the performance of the system listed on the TAB forms is not per project requirements.
   6. Line items of the functional performance test have failed.

F. Sampling
   1. Multiple identical pieces of non-life-safety or otherwise non-critical equipment may be functionally tested using a sampling strategy.

2. Significant application differences and significant sequence of operation differences in otherwise identical equipment invalidates their common identity. A small size or capacity difference, alone, does not constitute a difference. It is noted that no sampling by Subs is allowed in pre-functional checklist execution.
3. A common sampling strategy is the “xx% Sampling - yy% Failure Rule”, defined by the following example.
    a. xx = the percent of the group of identical equipment to be included in each sample.
    b. yy = the percent of the sample that if failing, will require another sample to be tested.
    c. The example below describes a 20% Sampling - 10% Failure Rule.
    d. Randomly test at least 20% (xx) of each group of identical equipment. In no case test less than three units in each group. This 20%, or three, constitute the “first sample.”
    e. If 10% (yy) of the units in the first sample fail the functional tests, test another 20% of the group (the second sample).
    f. If 10% of the units in the second sample fail, test all remaining units in the whole group.
    g. If at any point, frequent failures are occurring and testing is becoming more troubleshooting than verification, the CxA may stop the testing and require the responsible Sub to perform and document a checkout of the remaining units, prior to continuing with functionally testing the remaining units.

G. Re-Testing And Failure To Remedy Deficiencies
1. Despite Contractor’s best efforts to ensure systems are problem-free, it is expected that some deficiencies will be found during initial inspection of Pre-functional Checklist, and during initial Functional Testing; such deficiencies are expected to be minimal.
2. It is Contractor’s responsibility to remedy identified deficiencies, both in Pre-functional Checklist and in Functional Testing phases of work, in a timely and thorough manner.
3. It is Contractor’s responsibility to ensure that all deficiencies are corrected prior to requesting a re-inspection or re-test of systems and equipment. Do not request re-inspection or re-test until deficiencies are corrected.
    a. At his discretion, CxA may agree to re-testing systems or equipment where deficiencies remain which are beyond Contractor’s control to resolve expeditiously.
    b. Typically such re-testing of incomplete systems and equipment will take place only if remaining deficiencies are minor in scope and nature, and are of such nature that they cannot be resolved in a timely manner (such as those due to difficulties in obtaining parts, or where Owner has requested a change that has delayed work, etc.)
4. CxA will carry out a second re-inspection or re-test of systems and equipment subsequent to receiving Contractor’s request.
    a. If CxA finds deficiencies identified in initial inspection or test have not been remedied (with exception of un-resolvable deficiencies in 3.b. above), and such remaining deficiencies are significant enough to require additional inspection or re-testing, Contractor will be back-charged for CxA’s expenses, and time at a rate of $150.00 per hour and $100.00 expenses, for a third and any subsequent re-inspections and re-tests.

H. Deferred Testing
1. "Seasonal Commissioning” pertains to testing during peak heating or cooling seasons when HVAC equipment is operating at full-load or heavy-load conditions. Initial commissioning will be done as soon as contract work is completed, regardless of season. Seasonal Commissioning under full- or heavy-load conditions other than the current season will be handled at later time by GC and CxA.
2. If adequate load may be artificially placed upon heating or cooling equipment, CxA, at his discretion, may perform functional testing during non-peak load periods.

3. GC is to provide services of personnel and participate in seasonal testing process in the same manner as he would in non-seasonal testing.
4. Until off-season commissioning can be accomplished, Owner may retain an amount from GC's payment sufficient to cover the cost of off-season testing.
5. Unforeseen Deferred Tests: If any check or test cannot be completed due to building structure, required occupancy condition, or other reason, execution of checklists and functional testing may be delayed upon approval of Owner. Tests shall be conducted in same manner as seasonal tests, as soon as possible. Services of required parties will be negotiated. Make final adjustments to Operation and Maintenance Manuals and record drawings due to unforeseen deferred tests.
6. GC is to provide services of personnel and participate in deferred testing in the same manner as he would for normal commissioning.

3.7 TRAINING

A. The following requirements are in addition to Operations & Maintenance requirements specified elsewhere in this specifications manual.

B. Contractor shall be responsible for training coordination and scheduling, and ultimately to ensure that training is completed.

C. The training agenda (plan) shall include, at a minimum, the following elements:
1. Purpose of equipment.
2. Principle of how the equipment works.
3. Important parts and assemblies.
4. How the equipment achieves its purpose and necessary operating conditions.
5. Most likely failure modes, causes and corrections.
6. On site demonstration.

D. Commissioning authority shall be responsible for overseeing and approving content and adequacy of training of Owner personnel for all installed systems. Provide Commissioning authority with training plan two weeks before planned training.

3.8 OPERATIONS & MAINTENANCE MANUALS

A. The following requirements are in addition to Operations & Maintenance requirements specified elsewhere in this specifications manual.

B. Sub-Contractor shall compile and prepare documentation for equipment and systems specified in this Division, and shall deliver documentation to Contractor for inclusion in Operation & Maintenance Manuals, in accordance with requirements of Division 01, prior to training Owner personnel.

C. Provide Commissioning authority with a single, electronic copy of Operation & Maintenance Manuals for review. Commissioning authority copy of O&M manuals shall be submitted through Architect.

D. Operation and maintenance manuals shall include, service agency contact information, maintenance requirements, controls system settings and a narrative of how each system is intended to operate, including set points.

3.9 DOCUMENTATION

A. Commissioning authority shall provide documentation of process as follows:
   1. Preliminary commissioning report including test procedures, results of testing, itemization of deficiencies, deferred tests and climatic conditions required for performance of deferred tests. Preliminary commissioning report shall be issued to owner to demonstrate the first pass of testing has occurred and to demonstrate compliance with applicable codes.
   2. Final commissioning report shall include the final test and balance report, final results of functional testing, disposition of deficiencies discovered during testing, including the details of corrective measures used and functional testing procedures used for repeatability of testing in the future.

END OF SECTION 23 08 00

SECTION 23 09 63 - ENERGY MANAGEMENT AND CONTROL SYSTEM (EMCS)

PART 1 - GENERAL

1.1 GENERAL

A. The Energy Management and Control System (EMCS) shall be comprised of a Local Area Network (LAN) infrastructure, Operator Workstations (OWS), Engineering Workstations (EWS), a Primary Network Server (PNS), Network Area Controllers (NAC), Application Specific Controllers (ASC), Unitary System Controllers (USC), and Field Devices installed within the facility. The EMCS Contractor shall provide a completely wired system. Wireless components and wireless communication are not acceptable.

B. The Workstations, Primary Network Server, and Network Area Controllers shall be connected by a EMCS Contractor supplied and installed Local Area Network. The LAN shall comply with all IEEE Standards as outlined in the latest revision of IEEE 802: Local and Metropolitan Networks: Overview and Architecture.

C. If the EMCS contractor wishes to connect to the Owner's Wide Area/Local Area Network as part of the control system network, the EMCS contractor shall acquire permission in writing and include the letter in the submittal. Any system that requires connection to the owner's network for communication between NAC, ASC, USC and/or field devices that is submitted without the written permission from the owner shall be rejected. The EMCS Contractor shall coordinate with the Owner and supply all required information.

D. Access to the system, either locally in the building, or remotely from a central site or sites, shall be accomplished through standard web browsers, via the Internet and/or a local area network.

E. All EMCS controllers and workstations shall communicate using the protocols and network standards as defined by ASHRAE Std 135, latest revision. Management level TCP/IP Ethernet network speeds shall be 1 Gbps minimum and the Automation Level MS/TP network speeds shall be 76.8 Kbps minimum.

F. The Server shall gather data from the system and generate HTML pages accessible through a conventional web browser from all personal computers (PCs) connected to the network. System shall include any and all software and hardware to support at least 50 simultaneous users. The EMCS shall be compatible with all common web browsers.

G. Facility Operators shall be able to view and configure systems through the standard web browser and all graphical/data representations shall appear identical, whether the user is on site or viewing via the Internet at a remote location. Standard operator functions such as control point manipulation, configuration and viewing of trends, schedules and alarms shall be performed through the standard browser. Each mechanical system and building floor plan shall be depicted on the operator workstation by point-and-click graphics.

H. The EMCS shall directly control HVAC equipment as specified in the Sequence of Operations. Furnish Energy Conservation features such as Optimal Start/Stop, Night Setback, Setpoint Reset logic, and Demand Control Ventilation.

I. The EMCS vendor shall provide the following additional services as part of this specification: warranty and service during the warranty period; submittals, samples and record documentation; comprehensive startup and testing of the EMCS with documentation; training services for the owner and facility operators; coordination with other contractors and suppliers; operator and technician training program, and shall cooperate fully with the Project Commissioning Agent.

J. Products furnished under this specification but installed by other.
   1. Mechanical devices installed under Division 23 by the mechanical contractor or other suppliers:
      a. Temperature sensing thermowells.
      b. Automatic control valves and actuators.
      c. Pipe taps for flowmeters.
      d. Water pressure sensors and switches.
      e. Automatic control dampers and actuators not installed in air handling unit mixing boxes or louvers.
      f. Damper actuators for automatic control dampers installed in air handling unit mixing boxes.
      g. Damper actuators for variable air volume (VAV) terminal units.
      h. Mounting cost of controller and actuator for variable air volume (VAV) terminal units.
   2. Electrical devices installed under Division 26 by the electrical contractor:
      a. 120 VAC power to controllers and control panels at locations indicated on the drawings. Review and verify that these locations are adequate for the proposed EMCS.
      b. Interlock wiring to duct mounted smoke detector or fire alarm shutdown relays to HVAC equipment motor starters and variable frequency drives (VFD).

K. Provide and install all interconnecting cables between all operator's terminals and peripheral devices (such as printers, etc.) supplied under this section.

1.2 RELATED DOCUMENTS & REFERENCES

A. Drawings and general provisions of the contract documents, apply to this section including:
   1. Division 01 for General Conditions and Supplementary Conditions.
   2. Division 21 for fire protection equipment.
   3. Division 22 for plumbing equipment and domestic water systems.
   4. Division 23 for mechanical equipment, ductwork, and piping systems.
   5. Division 26 for electrical equipment, lighting control, and fire alarm systems.

B. The latest edition of the following standards and codes in effect as approved by the authority having jurisdiction and amended as of supplier's proposal date, and any applicable subsections thereof, shall govern design and selection of equipment and material supplied:
   1. ANSI MC85.1 - Terminology for Automatic Control.
   2. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE).
   3. ASHRAE Std 135 - BACnet.
   4. BTL Mark by the BACnet Testing Laboratories.
   5. Uniform Building Code (UBC), including local amendments.
   6. UL 916 - Underwriters Laboratories Standard for Energy Management Equipment. Canada and the US.
   7. NFPA 70, National Electrical Code (NEC).
   8. FCC Part 15, Subpart J, Class A.
   9. National Institute of Standards and Technology (NIST).
   10. IEEE 802: Local and Metropolitan Networks: Overview and Architecture.

1.3 RELATED WORK IN OTHER SECTIONS

A. Refer to Division 00 and Division 01 for allowances and related contractual requirements.

B. Refer to Division 21 for General Fire Protection Provisions and fire suppression pump.
   1. The EMCS contractor shall provide communications integration via BACnet/IP interface to each installed system listed above. BACnet MS/TP acceptable if IP interface is not available from equipment manufacturer.
   2. The EMCS contractor shall coordinate with all vendors providing above systems to obtain communications requirements and points lists. Map all available points to EMCS.

C. Refer to Division 22 for General Plumbing Provisions, domestic water heating systems, domestic water pumping systems, domestic water metering, and natural gas metering.
   1. The EMCS contractor shall provide communications integration via BACnet/IP interface to each installed system listed above. BACnet MS/TP acceptable if IP interface is not available from equipment manufacturer.
   2. The EMCS contractor shall coordinate with all vendors providing above systems to obtain communications requirements and points lists. Map all available points to EMCS.

D. Refer to Division 23 for General Mechanical Provisions for equipment such as chillers, cooling towers, boilers, pumps, air-handling units, terminal units, ventilation fans, variable frequency drives, unitary AC units, etc.
   1. The EMCS contractor shall provide communications integration via BACnet/IP interface to each installed system listed above. BACnet MS/TP acceptable if IP interface is not available from equipment manufacturer.
   2. The EMCS contractor shall coordinate with all vendors providing above systems to obtain communications requirements and points lists. Map all available points to EMCS.

E. Refer to Section 26 for General Electrical Provisions for equipment such as electrical switchgear control, electrical power monitoring, emergency generators, lighting control system, etc.
   1. The EMCS contractor shall provide communications integration via BACnet/IP interface to each installed system listed above. BACnet MS/TP acceptable if IP interface is not available from equipment manufacturer.
   2. The EMCS contractor shall coordinate with all vendors providing above systems to obtain communications requirements and points lists. Map all available points to EMCS.

1.4 ELECTRICAL POWER PROVISIONS

A. Primary power will be provided under Division 26 by the electrical contractor to the panel locations indicated on the mechanical & electrical drawings. Provide step down transformers within panel enclosures. Provide all necessary fuses and circuit protection devices.

B. Power will be provided to the controllers serving fan powered terminal units with electric heat via the control transformer provided with the unit.

C. All components of the EMCS shall be powered from the sources above. Provide final terminations from the locations indicated on the Division 23 Drawings.

D. The EMCS Contractor shall provide any additional control power that is required as part of this contract and not indicated by other. This shall include all conduit, cabling, circuit breakers, etc.

1.5 CONTRACTOR QUALIFICATIONS

A. The EMCS Contractor shall:
   1. Have a local staff of trained personnel capable of giving instructions and providing routine and emergency maintenance on the EMCS, all components and software/firmware and all other elements of the EMCS.
   2. Have a proven record of experience in the supply and installation of equivalent BACnet systems over a minimum period of five years. Provide documentation of at least three equal and complexity, if so requested by the Owner's Representative.
   3. Be a factory certified representative of the native BACnet EMCS manufacturer for design, installation, and service of the proposed system.
   4. Have comprehensive local service, training and support facilities for the total EMCS as provided. Maintain local, supplies of essential expendable parts.

1.6 SUBMITTALS

A. ALL DOCUMENTS SUBMITTED SHALL BE IN NATIVE PDF FORMAT. NO SCANS.

B. Shop Drawings:
   1. The following information shall be included on the cover page for each shop drawing and equipment documentation submittal:
      a. Project name with date. Refer to the applicable specifications by name and number.
      b. Provide submittal number and re-submittal number and date as applicable.
      c. Provided name and address of Consulting Engineer, Mechanical Contractor, General Contractor
   2. Shop drawings shall be CAD generated, plot size of 8-1/2" x 11" or 11" x 17". Drawings shall include diagrams, mounting instructions, installation procedures, equipment details and software descriptions for all aspects of the system to be installed.
   3. Provide schematic of systems indicating instrumentation locations, all interconnecting cables between supplied cabinets on a mechanical floor plan.
   4. Software specifications and descriptions including operating sequences.
   5. Provide a bill of material that indicates specific manufacturer, part number, part description and quantity of each device for all system components.
   6. Provide a list of the wire labels to be installed on each end of the control wiring, at the device and the control panel terminal. Labels shall be machine generated, typed and legible with a maximum of 17 characters. The label description "AHU-1 SAT" shall indicate the supply air temperature of AHU-1.
   7. Equipment Schematic: Provide an electronic equipment schematic for each piece of mechanical equipment. The schematic shall display all mechanical equipment characteristics including fans, dampers, valves, sensors and other applicable control devices. The schematic shall show wiring terminations to each control device as shown in the submittal and as-build documentation. Control devices shall be labeled by a symbol that can easily be identified in a bill of material that is shown on this graphic. The bill of material shall show the device symbol, description, manufacture and part number.
   8. Sequence of Operations: The control sequences shall be viewable for each piece of mechanical equipment and be in a text format as shown in the as built documentation. The sequence of operations shall be selectable at the applicable location for the control program.

C. Control component submittals:

1. Component technical data sheets with mounting and installation details.
2. The documentation shall include comprehensive and complete details of the BIBB and automation level documentation including address, associated controller type, etc. as required and for the interface to the EMCS.
3. Details of networks/communications equipment, cabling and protocols proposed. Provide schedule of cabling including details of proposed cable types.
4. Module Drawing: Provide an electronic wiring diagram of each control module (as shown in submittal documentation). Diagram shall display wiring schematic and terminations to end devices. Diagram shall display each input and output terminals and label those that are used for the control application. Diagram shall display module type/name and network address.
5. Field sensor and instrumentation specification sheets. Provide complete manufacturer's specifications for all items that are supplied. Include vendor name of every item supplied.
6. Schedule and specification sheets for dampers, valves and actuators.
7. Design and provide layout of all components of panel mounted control devices, terminal strips and power supplies.

D. Colorgraphics: Provide sample layout of color graphic representations of the systems for review. The submittal shall indicate the quality of the graphic to be provided with the system with a sample of the specific control points to be included. Control points shall as a minimum include points indicated in the input/output summary, control schematic and primary controlling points defined in the sequences of operation. Provide a sample of a floor plan layout, typical AHU, terminal unit, outside air pretreatment unit, variable frequency drive, exhaust/supply fan, chiller plant and hot water plant. For control points to be provided by equipment BACnet integration provide sample of the control points, up to 25 total.

E. Verification Reports. The submittal shall include a sample of the verification reports to be utilized during the verification section of this specification. Sample reports shall be approved as submitted or be modified by the engineer or owner's representative. The verification reports shall be included in the final Operation & Maintenance Manuals. Reports shall be provided in electronic PDF format.
   1. Project Systems Verification Form for each controller.
      a. General information for each form shall include: project name; associated equipment with mark number; control panel number and location; controller number and model number; controller device instance number (address); MS/TP LAN segment number; verifying technician and date.
      b. Each connected control point and device shall contain the following columns with a separate line for each connected physical point: point description (same as device label); input/output number for each connected control device (AI-XX, AO-XX, DI-XX, or DO-XX).
      c. Check boxes confirming that the verification tasks have been completed: device location, proper termination at device; proper termination at control panel; sequence is verified; point trend is enabled.
      d. Data entry boxes indicating measured/confirmed values: preliminary control point value on the graphic; observed control point value; calibration or adjustment value to correct offset; final displayed point value on the color-graphic; date of verification; engineer or owner's representative verification.
   2. Control Panel Verification Form for each control panel.

a. General information: panel location and identification number; panel dimensions and NEMA rating; panel properly installed; Class 1 and Class 2 wiring are properly separated; correct voltage to the panel; no shorts or grounds in panel; no induce voltages in panel wiring; point to point termination match submittal; devices are mounted in the correct location; controller software revision number; address of controllers; panel device checkout is complete; panel startup is complete.

3. Sequence of Operation Verification Form per piece of equipment (AHU, VAV, chiller, boiler, etc.).
   a. General information: project name; system identifier; building area served; control panel and controller numbers; controller model number and instance number (address); MS/TP LAN segment number; name of verifying technician and date.
   b. Each step of the sequence of operation for each piece of equipment shall be documented shall include a “description of test”, “input to trigger test” and “expected outcome”. A pass/fail checkbox shall indicate each of these actions. Provide space for technician approval with associated date.

F. Operating and Maintenance (O&M) manuals: Provide O&M manual with full information to allow the owner to operate, maintain and repair installed products. Include trade names with model numbers, color, dimensions and other physical characteristics.
   1. Format: Produce on 8-1/2 x 11-inch pages, and bind in 3-ring/binders with durable plastic covers. Label binder covers with printed title “OPERATION AND MAINTENANCE MANUAL”, title of project, and subject matter and “Number _ of _” of binder. Provide substantial dividers tabbed and titled by section/component number.
   2. Table of Contents for each volume:
      a. Part 1: Directory with name, address and telephone number of Designer, Contractor and Subcontractors and Suppliers for each Project Manual section.
      b. Part 2: Operation and maintenance instructions, arranged by Project Manual Section number where practical and where not, by system. Include:
   3. Product design criteria, functions, normal operating characteristic and limiting conditions. Installation, alignment, adjustment, checking instructions and troubleshooting guide. Operating instructions for start-up, normal operation, regulation and control, normal shutdown and emergency shutdown. Test data and performance curves.
   4. Spare parts list for operating products, prepared by manufacturers including detailed drawings giving location of each maintainable part, lists of spares recommended for user- service inventory and nearest source of in-stock spares.

G. Record Documentation:
   1. Details of all alarm, diagnostic, error and other messages. Detail the Operator action to be taken for each instance.
   2. Detail special programs provided and provide a complete programming instruction manual. Detail operation of all software applications.
   3. Detailed list of the database for all installed devices.
   4. Record drawings shall be CAD generated and shall include final locations and point ID for each monitored and controlled device.
   5. In additional to the required hard-copies, provide a CD-ROM with all of the record documentation in PDF format and a CD-ROM containing backup copies of all installed software and graphics.
   6. Online as-built documentation: provide digital replications of as-builts that shall be accessible from each equipment graphic controlled or monitored by the EMCS.

1.7 WARRANTY

A. Warranty work and the equipment provided under this contract shall be for a period of one year from the date of Substantial Completion. Warranty shall cover all components, system software, parts and assemblies supplied by this contractor and shall be guaranteed against defects in materials and workmanship for one (1) year from the date of Substantial Completion. Labor to troubleshoot, repair, reprogram or replace system components that have failed due to defects in materials and workmanship shall be provided by this contractor at no charge to the owner during the warranty period. All corrective software modifications made during warranty service periods shall be updated on all user documentation and on user and manufacturer archived software disks. All warranty work shall be performed by the EMCS contractor's local service group.

B. Warranty shall not include routine maintenance, e.g., equipment cleaning, mechanical parts lubrication, pilot lamp replacement, operational testing, etc. Warranty shall not cover repair or replacement of equipment damaged by under- or over-voltage, misuse, lack of proper maintenance, lightning, water damage from weather or piping failure.

C. Hardware and software personnel supporting this warranty agreement shall provide on-site or off-site service in a timely manner after failure notification to the EMCS contractor. The maximum acceptable response time to provide this service at the site shall be 24 hours, during normal working hours.

1.8 OPERATIONS PERSONNEL TRAINING

A. Provide a training session for the owner's operations personnel. Training session shall be performed by a qualified person who is knowledgeable in the subject system/equipment. Submit a training agenda two (2) weeks prior to the proposed training session for review and approval. Training session shall include at the minimum:
   1. Purpose of equipment.
   2. Principle of how the equipment works.
   3. Important parts and assemblies.
   4. How the equipment achieves its purpose and necessary operating conditions
   5. Most likely failure modes, causes and corrections.
   6. On site demonstration that includes hands-on demonstration of the manipulation of setpoints, schedules and other adjustable elements of the system.
   7. The demonstration shall be on the actual, completed graphic interface pages for the specific project.

B. Provide a second training session 3 months after initial session for any follow-up or additional training requested by owner's personnel. Allow 3 hours for the second training session.

1.9 OPERATOR WORKSTATION (OWS)

A. The Operator Workstation shall be any personal computer, connected to the LAN, with appropriate web browser software installed.

1.10 ENGINEERING WORKSTATION (EWS)

A. The Engineering Workstation shall be any personal computer, connected to the LAN, with a registered copy of the EMCS contractor supplied engineering and/or programming software installed. The EMCS contractor shall provide at least one copy of all required software(s), to enable the Owner complete editing/programming functions of all controllers, graphics, and control logic.

B. The EMCS shall provide one personal computer (PC) which is compatible with the performance required by the EMCS Engineering Software if an engineering workstation is specified for the system.

PART 2 - PRODUCTS

2.1 ACCEPTABLE EMCS VENDORS

A. DISTECH - JMS Integrated Building Solutions - TDIndustries

2.2 PRIMARY NETWORK SERVER (PNS)

A. The EMCS Contractor shall provide and install the Primary Network Server as part of this system. The PNS shall utilize the Internet and provide efficient integration of standard open protocols. The PNS shall maintain comprehensive database management, alarm management and messaging services, and graphical user interface as follows:
   1. Support an unlimited number of users over the Internet/intranet with a standard web browser to access alarms, trend logs, graphics, schedules and configuration data. Access to the PNS shall be password protected utilizing authentication and encryption techniques. An audit trail of database changes indicating user, time stamp, and audit action shall be provided.
   2. Enterprise level information exchange using an SQL database and HTTP/HTML/XML text formats.
   3. Synchronize controller databases, database storage scheduling, control and energy management routines
   4. Alarm processing and routing which includes email, SMS text messages and paging.
   5. HTML based help system that includes comprehensive online system documentation.
   6. Support of multiple Network Area Controllers (NAC) connected to a Local Area Network.

B. Server Functions
   1. It shall be possible to access all Network Area Controllers (NAC) via a single connection to the server through the Ethernet LAN. In this configuration, each Network Area Controller can be accessed from a single user login.
   2. The PNS shall provide the following functions, at a minimum:
      a. The server shall provide complete access to distributed global data. The server shall provide the ability to execute global control strategies based on control and data objects in any NAC in the network, local or remote.
      b. The server shall include a master clock service for its subsystems and provide time synchronization for all NACs.
      c. The server shall provide scheduling for all NACs and their underlying field control devices.
      d. The server shall provide demand limiting control that operates across all NACs. The network server shall be capable of multiple demand limiting programs for sites with multiple meters and or multiple sources of energy. Each demand program shall be capable of supporting separate demand shed lists for effective demand control.

e. The server shall implement the BACnet Command Prioritization scheme (16 levels) for safe and effective contention resolution of all commands issued to NACs. Each Network Area Controller supported by the server shall have the ability to archive its log data, alarm data and database to the server, automatically. Archiving options shall be user-defined including archive time and archive frequency.
f. The server shall provide central alarm management for all NACs supported by the server. Alarm management shall include: routing of alarms to a video display, a printer, an email and pager; view and acknowledge alarms; query alarm logs based on user-defined parameters
g. The server shall provide central management of logged data for all NACs supported by the server. Logged data shall include process logs, runtime and event counter logs, audit logs and error logs. Log data management shall include: viewing and printing log data; exporting log data to other software applications; query log data based on user-defined parameters

3. The Primary Network Server shall be capable of supporting the following open system drivers;
   a. BACnet/IP
   b. Modbus TCP

C. Network Server Platform Requirements
1. Rack-Mounted Server Computer Hardware: DELL PowerEdge R220 or equal, Intel Xeon Gold 3.0 GHz or higher, 32GB RAM, 2 TB hard drive, video card, 22” color monitor, and Ethernet adapter 1Gbps or higher.
2. Operating system software shall be Microsoft Windows® 10 Professional or higher.

2.3 NETWORK AREA CONTROLLER (NAC)

A. Provide one or more Network Area Controllers (NAC) to meet the sequence of operations and the type and quantity of devices being integrated into the system. The NAC shall provide the interface between the local area network and the field controllers. The NAC shall provide global supervisory control functions over the associated controllers and shall be capable of executing application control programs to provide: calendar functions; scheduling; trending; alarm monitoring and routing; time synchronization; integration of controller data for each applicable protocol; network management functions for all network devices. The user may view real-time information via web-based data.

B. The Network Area Controller shall provide the following hardware features as a minimum: Ethernet Ports 100Mbps or higher, BACnet MS/TP ports, battery backup, DDR RAM memory, flash memory for long term data backup.

C. Provide an uninterruptible power source (UPS) per network controller to maintain operation for 1 hours.

D. The NAC shall be capable of operation over a temperature range of 32 to 122 °F and operation over a humidity range of 5 to 95% RH, non-condensing; storage temperatures of between 32 and 158 °F.

E. The NAC shall provide multiple user access to the system and support for ODBC or SQL. A database resident on the NAC shall be an ODBC-compliant database or must provide an ODBC data access mechanism to read and write data stored within it.

F. The NAC shall be capable of supporting the following open system drivers;
1. BACnet/IP

2. BACnet MS/TP
3. Modbus TCP
4. Modbus RTU

G. Event Alarm Notification and actions: The NAC shall provide alarm recognition, storage; routing, management, and analysis to supplement distributed capabilities of equipment or application specific controllers. Alarm conditions shall be routed to any defined user location whether connected to a local or wide-area network.
   1. Alarm generation shall be selectable for annunciation type and acknowledgement requirements including but limited to: alarm; return to normal; fault.
   2. Provide for the creation of a minimum of eight alarm classes for the purpose of routing types and or classes of alarms, i.e.: security, HVAC, Fire, etc. Allow timed routing of alarms by class, object, group, or node.
   3. Provide alarm generation from binary object “runtime” and/or event counts for equipment maintenance (i.e. filter status, fan run status). Authorized users shall be able to reset runtime or event count values with appropriate password control.
   4. Control equipment and network failures shall be treated as alarms and annunciated.
   5. Alarms shall be annunciated in any of the following manners as defined by the user: screen message text; e-mail of the complete alarm message to multiple recipients. Provide the ability to route and email alarms based on: day of the week, time of day and recipient.
   6. Color-graphic shall have flashing alarm object(s). Printed message may be routed directly to a dedicated alarm printer.
   7. The following shall be recorded by the NAC for each alarm (at a minimum): time and date; location (building, floor, zone, office number, etc.); associated equipment. Upon acknowledgement of the alarm the NAC shall document the time, date and authorized user. The number of alarm occurrences since the last acknowledgement shall be recorded.
   8. Defined users shall be given proper access to acknowledge any alarm, or specific types or classes of alarms defined by the user. Alarm actions may be initiated by user defined programmable objects created for that purpose.
   9. Alarm archiving: A log of all alarms shall be maintained by the NAC and/or a server and shall be available for review by the user. Provide a “query” feature to allow review of specific alarms by user defined parameters. A separate log for system alerts (controller failures, network failures, etc.) shall be provided and available for review by the user.

H. Data Collection and Storage: The NAC shall have the ability to collect data for any property of any object and store this data for future use.
   1. The user shall designate the log as an interval log or deviation log. For an interval log, the object shall be configured for time of day, day of week and the sample collection interval. For deviation log, the object shall be configured for the deviation of a variable to a fixed value. This value, when reached, will initiate logging of the object. For all logs, provide the ability to set the maximum number of data stores for the log and to set whether the log will stop collecting when full, or rollover the data on a first-in, first-out basis. Each log shall have the ability to have its data cleared on a time-based event or by a user-defined event or action.
   2. All log data shall be stored in a relational database in the NAC and the data shall be accessed from the server or a standard web browser. All log data, when accessed from the server, shall be capable of being manipulated using standard SQL statements.
   3. All log data shall be available to the user in the following data formats: HTML, XML, plain text, comma separated values, as a minimum.

4. The NAC shall have the ability to archive its log data either locally or remotely to the server or other NAC on the network.

I. Local Access: The NAC shall provide redundancy of system access to the local controllers at the remote building if the Primary Network Server should lose communication or be off-line. The NAC shall maintain setpoint and scheduling features, access to the color-graphic displays, maintain trend logs and reports. Upon restoration of communication with the PNS the archived information shall be transmitted to the server for archiving.

2.4 SOFTWARE FOR THE NAC

A. The distributed architecture of the operating system for the PNS and NACs shall provide the operator a comprehensive interface to allow the operator to configure and customize the EMCS to optimize the HVAC system to save energy, schedule and maintain equipment and provide occupant comfort. The provided graphical toolset shall allow the operator to create applications in a drag and drop environment.
   1. Input/output capability shall allow the operator to request the current value or status of the control point; command/override equipment to a specific state; add, change or delete control points, alarm limits and controllers; change descriptors to control points and equipment; modify parameters; create or modify DDC loops.

B. Operator System Access: Via software password with five access levels at workstations and at each control unit.

C. Color graphic tools shall allow the user to create equipment and floor plan graphics from a standard library of symbols; allow custom generation of symbols; utilize over 64 or more colors; create real-time dynamic data for the graphics. Up to 60 control points may be displayed on each graphic.
   1. Provide a link between compatible graphics to minimize the paths to additional information. For example, provide the link from the zone sensor to the VAV terminal to the air handling unit and to the central plant. Web pages shall be provided to allow the operator to zoom into specific areas of the facility and then link the space to the floor plan to the overall building and then to the facility site plan.
   2. Graphical tools shall allow the creation of bar graphs, pie graphs and other tools to visualize control information such as run time hours, energy consumed and occupant comfort.

D. Alarm processing tools shall allow the operator to create alarm messages that include as a minimum: time of alarm, point descriptor, alarm condition and remote annunciation. Critical alarms shall be displayed, archived to a storage device or printed on a alarm printer. Alarms shall be displayed in order of occurrence and have an optional audible alarm indicator.
   1. Print alarm messages, up to 60 characters in length, for each alarm point specified.
   2. Alarms may be routed to other devices including web-enabled cell phones, pagers, tablet PCs and designated personal computers on the network or Internet.
   3. Operator specifies when alarm requires acknowledgment. Continue to indicate unacknowledged alarms after return to normal. An alarm log shall be maintained to archive alarms for future reference with the above specified parameters as well as indicating the person acknowledging the alarm.
   4. The graphical display shall indicate the number of the current unacknowledged alarms by individual building site or by sum of all campus-wide facilities.

5. The operator may create and forward an e-mail message to another user directly from the graphical interface so that the message can be read when the second user logs on to the system.

E. Upon a power failure to equipment in the facility, the EMCS shall automatically start equipment upon the restoration of power. Program a time delay between individual equipment restart on a schedule to minimize demand charges from the utility company.

F. Custom reports may be created by the operator with a requested time and date manually or automatically. All reports may be logged to a storage device for future reference. The data reports shall allow customization and scaling of the X-Y coordinates; plotting of tabular reports; provide multi-point graphical reports with not less than eight variables on the same report. Print reports on daily, weekly, monthly, yearly or scheduled basis as scheduled.

G. The network server current operating system, database, color-graphics, custom reports shall be backed up automatically to a remote server or storage device as directed by the owner's representative.

H. Maintenance Management capability shall allow the system to monitor and log the run-time for HVAC equipment; schedule maintenance reports that include recommended material and labor for the assigned task.

2.5 APPLICATION SPECIFIC CONTROLLERS (ASC)

A. All devices required for single loop control shall be terminated on a single controller. (for example, CHW loop pressure control. The differential pressure sensor and the pump VFD ramp signal.)

B. ASCs shall be capable of implementing control strategies for the system based on information from any or all connected inputs. The AC shall utilize factory pre-programmed global strategies that may be modified by field personnel on-site. Global control algorithms and automated control functions should execute via a 32-bit processor

C. Programming shall be object-oriented using control program blocks that will support a minimum of 500 Analog Values and 500 Binary Values. Analog and binary values shall support standard BACnet priority arrays. Provide means to graphically view inputs and outputs to each program block in real-time as program is executing.

D. Controller shall have adequate data storage to ensure high performance and data reliability. Battery shall retain static RAM memory and real-time clock functions for a minimum of 1 year (cumulative). Battery shall be a field-replaceable (non-rechargeable) lithium type. The onboard, battery-backed real time clock must support schedule operations and trend logs.

E. The base unit of the ASC shall host various I/O combinations including universal inputs, binary outputs, and switch selectable analog outputs (0-10V or 0-20 mA). Inputs shall support thermistors, 0-5VDC, 0-10VDC, 4-20mA, dry contacts and pulse inputs directly.

F. All binary outputs shall have onboard Hand-Off-Auto switches and a status indicator light. HOA switch position shall be monitored. The position of each HOA switch shall be available system wide as a BACnet object.

G. Controller shall be capable of BACnet communication. BACnet Conformance:
   1. Standard BACnet object types supported shall include as a minimum: Analog Input, Binary Input, Analog Output, Binary Output, Analog Value, Binary Value, Device, File, Group, Event Enrollment, Notification Class, Program and Schedule object types. All necessary tools shall be supplied for working with proprietary information.

H. Schedules: Each ASC shall support a minimum of 10 BACnet schedule objects.

I. Logging Capabilities: Each controller shall support a minimum of 100 trend logs. Sample time interval shall be adjustable at the operator's workstation. Controller shall periodically upload trended data to system server for long term archiving if desired. Archived data stored in database format shall be available for use in third-party spreadsheet or database programs.

J. Alarm Generation: Alarms may be generated within the system for any object change of value or state either real or calculated. This includes things such as analog object value changes, binary object state changes, and various controller communication failures. Alarm logs shall be provided for alarm viewing. Log may be viewed on-site at the operator's terminal or off-site via remote communications. Controller must be able to handle up to 200 alarm setups stored as BACnet event enrollment objects -system destination and actions individually configurable.

2.6 UNITARY SYSTEM CONTROLLERS (USC)

A. All devices required for single loop control shall be terminated on a single controller. (for example, cooling coil control valve control. The temperature sensor and the valve control signal.)

B. The EMCS Contractor shall provide all Unitary System Controllers. USCs shall be fully programmable or applications specific controllers with pre-packaged operating sequences maintained in Flash RAM.

C. The USC shall be a node on the automation network and shall control its own communications so that the failure of any one node, shall not inhibit communications on the network between the remaining nodes. USCs shall be totally independent of other network nodes for their monitoring and control functions.

D. Provide each USC with a battery back-up for the protection of volatile memory for a minimum of 72 hours. Batteries shall be rated for a seven-year life.

E. All associated applications programs shall reside at the USC. The USC shall not require communication to any other panel for normal operating sequences other than time scheduled base commands.

F. Control shall be based on algorithms, i.e. proportional plus integral plus derivative (PID), proportional plus integral (PI), or proportional to comply with the sequences of operation PID algorithms shall maintain the system operation within +/- 2% of setpoint.

G. The USC shall be configured with sufficient input/output capacity to achieve the required control points to meet the sequence of operations.

2.7 VAV TERMINAL UNIT CONTROLLER (TUC)

A. All devices required for single loop control shall be terminated on a single controller. (for example, terminal unit air valve control. The flow sensor and the actuator control signal.)

B. The EMCS Contractor shall provide all controllers required for all variable air volume (VAV) terminal units. The number and location of terminal units and airflow rates shall be as indicated on the mechanical drawings.

C. The TUC shall be capable of monitoring and controlling the following parameters for VAV terminal units per the sequences of operation and input/output summary: space temperature; primary air flow rate; damper modulation; heating coil stage control, heating valve control, heating SCR control (as applicable); fan on/off control; supply air sensor; occupancy senor; carbon dioxide sensor or humidity sensor.

D. Furnish primary damper actuators, for factory mounting, meeting the following requirements: direct shaft mounting; adequate torque, to properly operate the damper from fully open to fully closed without binding; locking “V” groove or similar means to prevent slippage between actuator and shaft.

E. The EMCS Contractor shall field install the following components for each terminal unit: space temperature sensor; supply air temperature sensor; occupancy sensor, and carbon dioxide sensor as indicated on the Mechanical Drawings.

F. The EMCS Contractor shall furnish to the terminal unit manufacturer the following components for factory installation and wiring for each terminal unit: VAV controller with integral differential pressure transducer and damper actuator.

G. The terminal unit manufacturer may provide the following components for each terminal unit for interface and mounting of the TUC: primary air dampers; enclosure to house the TUC and associated components including suitable mounting brackets shall be NEMA 1 rating and located outside the terminal unit; multi-point averaging type flow sensor at the primary air inlet to the terminal unit; 24 VAC control transformer; 24 VAC fan control relay interface; 24 VAC heater control relay interface (up to two stages); 24 volt SCR heater input as scheduled (0-10 Vdc or 4-20 mA).

H. Any items required for proper operation but not provided by TU vendor, shall be provided under this section.

2.8 AIR HANDLING UNIT CONTROLLER

A. All devices required for single loop control shall be terminated on a single controller. (for example, AHU static pressure control. The differential pressure sensor and the VFD ramp signal.)

B. The EMCS Contractor shall provide controllers required for chilled/hot water and DX/electric heat air handling units and fan coil units. Provide an enclosure to house the controller and associated components including suitable mounting brackets shall be NEMA 1 rated and located outside the FCUs.

C. The controller shall be capable of monitoring and controlling the following parameters per the sequences of operation and input/output summary; space temperature; space relative humidity sensor; cooling/heating stage control or modulating valve control; fan on/off control and status; supply air sensor; occupancy sensor; carbon dioxide sensor; VFD control and monitoring.

2.9 EMCS CONTROLLER LEVEL NETWORK

A. EMCS Automation Level Network shall consist of BACnet MS/TP (76.8 Kbps minimum). Data transfer rate and data throughput as required to meet the alarm annunciation requirements.

2.10 SOFTWARE OVERVIEW

A. Dynamic Colored Floor plans: Dynamic colored floor plans that compare actual space conditions to setpoints shall be provided on all floorplan graphics displayed on the front-end. Floorplan enlargements shall also use the thermographs to display space conditions. Zones within the set point range shall appear transparent white. As the space gets warmer the zone color shall gradually modulate from transparent white to transparent red to identify a hot zone. As the space conditions get cooler the zone color shall gradually modulate from transparent white to transparent blue to identify a cold zone. Each zone shall indicate the current actual zone temperature within the zone. The floor plans shall use a dynamic scheduling icon to indicate schedule occupancy for each zone and provide direct one-click access to that zones unique schedule. Provide a designated icon or symbol indicating that the zone is in the occupied/unoccupied condition. From the floorplan graphic, the operator shall be able to click on any zone and go directly to the graphic for the piece of equipment controlling that zone. All dynamic floor plans shall be visible via web interface as well as on the LAN. The authorized system operator shall be able to change the zone or system identifier (or name) on the graphic and that change shall be distributed to other associated graphics and to the equipment controller.

B. Pop up Trends: Provide trend logs that automatically pop up when the operator mouse clicks on the point from the graphic. Provide pop up trends for all dampers, control valves, temperature sensors, carbon dioxide sensors, humidity sensors, airflows, static pressures, flow meters, VFD speeds, etc. The EMCS contractor shall set up all trends for the owner. The pop-up trend shall include a trend tool that allows the operator to modify the trend time scale and sample interval for up to 10 sample values. The trends shall be graphical on the computer screen but shall provide an output as an .xls, .csv, .pdf, HTML, r text file.

C. Interactive Maps: Implement JAVA SCRIPT API 3.0 or newer, such as Google Interactive maps depicting the facility location to indicate the site plan. This is not a static image and must be completely interactive.

D. Custom User HTML applications: The EMCS shall utilize HTML applications as an extra feature. At minimum, provide 7-day forecast, weather radar, traffic map and hurricane tracker. All of these features shall be imbedded into the EMCS system.

E. Provided a web-based EMCS platform; contractor shall provide an Open License software. Licenses that are not open are not acceptable. There shall be no per seat or per user licensing fee charged to the owner by the contractor.

F. System shall use the BACnet protocol for communication to the operator workstation or web server and for communication between control modules. Schedules, setpoints, trends, and alarms shall be BACnet Objects.

G. User access shall include 50 assigned operators that shall include five levels of access within the web system. Each operator log-in shall have an expiration date to allow for temporary access to the system. The operator's access description shall include his e-mail address and cell/phone numbers. The operator access can be limited from 5 minutes to permanent access. The user shall be limited to eight bad login attempts before being locked out of the system.

H. Global modification: Provide the capability for global modification of user definable parameters of all points shall be provided. Global modification is defined as the mass adjustment of user definable parameters across a defined group, area, facility, campus, or network. Parameters shall include, but not be limited to temperature set point (VAV boxes, AHU Discharge, VAV AHU Static Pressure Setpoints etc.), equipment start/stop, equipment status, valve output signal, VFD speed control signal, and damper position signal. User shall be able to lock the definable parameter to a set value, or adjust a set point to an operator adjustable value. This function shall be accomplished through the standard graphical user interface/workstation and is to be selectively applicable by the user to all controllers on the network, all controllers in a specific facility or all controllers in a specific zone within a specific facility.

I. The system operator shall be able to override the output signal to the valves, dampers, variable frequency drives, etc. with the use of the PC mouse click on the device. The system override shall include a Hand-Off-Auto (HOA) capability. If the output is commanded to the hand position the operator shall designate an output value of 0-100% in 1% increments. The hand override position shall be permanent or expire after a designated time period and revert to the auto position. The color-graphic shall indicate the device that has been overridden by a color change of the output value.

J. For non-emergency in-warranty events the system operator may submit a Service Request directly from the floor plan or system graphic. The web interface shall include the EMCS suppliers contact information including phone numbers and e-mail address. The service request will be logged into the EMCS suppliers service department. A non-response by the assigned technician shall elevate the request to the next highest manager or supervisor until the system operator receives an response that their request has been received and is scheduled for a resolution. All requests for service shall be maintained in the customer's database for future reference. The service request capability may be extended after the expiration of the warranty as part of a service agreement.

K. The web-based system shall be accessible from Tablet PCs and provide the same functionality that is available from personal computers connected through the LAN or WAN to the system operator. The tablet PCs as a minimum shall include an Apple iPad and Google Android based tablet PC. Operation shall include touch screen capability and use of the tablet keyboard screen. The operator shall be able to view color-graphics, system trends, override setpoints, change time schedules, and override damper and valve positions.

2.11 ENERGY SAVING PROGRAMS

A. Demand Limiting: Demand limiting programming and sequence shall include, but not be limited to the following:

1. Monitor total power consumption for each power meter and shed associated loads automatically to reduce power consumption to an operator set maximum demand level.
2. Integrate with lighting controls to reduce lighting power to an operator set maximum demand level.
3. Provide a means from the graphical user interface for the system operator to manually initiate or disable the demand limiting sequence.
4. Provide programming that will allow a demand response signal from an approved entity (electrical service provider) to remotely initiate or disable the demand limiting sequence.
5. Provide programming that will initiate demand limiting according to a schedule.
6. When demand limiting is initiated, the EMCS shall:
    a. Increase the space cooling temperature setpoint by 4 degrees F (adj), above the current operating setpoint. The rate of change for the temperature setpoint increase shall be operator adjustable.
    b. Decrease the space heating temperature setpoint by 4 degrees F (adj), below the current operating setpoint. The rate of change for the temperature setpoint decrease shall be operator adjustable.
    c. Automatically reduce lighting power on the circuits indicated on construction documents.
7. When demand limiting is disabled, the EMCS shall reset temperature setpoints and lighting power levels back to original operating setpoints.
8. Demand limiting shall be confined to “non-critical” zones. For purposes of planning, assume all zones are “non-critical” unless otherwise noted on the construction documents. All zones shall have the option to be added or removed from the demand limiting program, by the system operator.
9. The EMCS shall include a graphic "page" that shows all adjusted setpoints (original setpoints and demand limited setpoints) and the power meters being monitored to confirm the programming is operational and effective at shedding the associated loads.

B. Duty Cycling: Periodically stop and start loads, based on space temperature, and according to various on/off patterns.

C. Automatic Time Scheduling: Self-contained programs for automatic start/stop/scheduling of building loads. Support up to seven (7) normal day schedules, seven (7) "special day" schedules and two (2) temporary schedules.

D. Optimal Start/Stop: Perform optimized start/stop as function of outside conditions, inside conditions, or both. Optimization shall be adaptive and self-tuning, adjusting to changing conditions by modifying occupancy period based upon the desired temperature at beginning and end of the occupancy period. Base optimization on occupancy schedules, outside air temperature, seasonal requirements, and interior room temperature. Employ adaptive model prediction for how long building takes to warm up or cool down under different conditions.

E. Night-Setback Program: Reduce heating space temperature setpoint or raise cooling space temperature setpoint during unoccupied hours in conjunction with scheduled start/stop and optimum start/stop programs.

F. Setpoint Reset: Setpoints for control of variable load systems shall be reset based on load demand, as described in the Sequence of Operations.

G. Calculated Points: Define calculations and totals computed from monitored points (analog/digital points), constants, or other calculated points.

H. Event Initiated Programming: Any data point capable of initiating event, causing series of controls in a sequence.

I. Holiday Scheduling

J. Direct Digital Control: Furnish software so operator is capable of customizing control strategies and sequences of operation by defining appropriate control loop algorithms and choosing optimum loop parameters.

K. Trend logging shall be provided for all points per the input/output summary where there is a change in the analog or binary signal. Each controller shall be capable of storing trend values and then automatically transfer data to the NAC or the NS hard disk. Trend data shall be updated continuously per the operator assigned interval at intervals as low as one minute. Collect samples at intervals specified in minutes, hours, days, or month. Output trend logs as line-graphs or bar graphs. Binary points (input and output) shall only be logged upon a change of value (COV). Display trend samples on workstation in graphic format. Automatically scale trend graph with minimum 60 samples of data in plot of time versus data.

2.12 FIELD INSTRUMENTATION

A. Temperature Sensors: All temperature sensors shall be thermistor type, factory-calibrated to within 0.5 °F, interchangeable with housing appropriate for application. Sensors shall have a temperature curve rated for the application. Sensor wiring terminations shall be in a galvanized box.
   1. Outside air temperature sensors shall be installed in weather proof enclosure with ventilated sun-shied.
   2. Duct mounted temperature sensors shall be averaging type for supply air, mixed air and low temperature applications for air handling units. Duct probe temperature sensor shall be acceptable for terminal units.
   3. Space temperature sensors shall contain a backlit LCD digital display and user function keys along with temperature sensor, setpoint adjustment and after-hours override use. Override time may be set in one-hour increments.
   4. Thermowell temperature sensors shall be stainless steel probe of length that is equivalent to a minimum of 50% of the pipe diameter. End-to-end accuracy shall be ± 0.5 deg. F. Connection box shall be moisture/water proof with conduit fitting. Furnish the stainless steel thermowell to the mechanical contractor for installation. A thermal conducting grease shall be installed in the thermowell to provide uniform temperature sensing.
   5. Provide flat plate stainless steel space temperature sensors with no local setpoint adjustment as indicated on the drawings.

B. Carbon Dioxide Sensors: The sensor shall be capable of monitoring carbon dioxide concentration with an accuracy of +/- 30 parts per million (PPM). The sensor shall produce a linear 0-10 VDC or 4-20 mA signal over the range of 0 to 2000 PPM. The sensor shall measure using non-dispersed infrared (NDIR) technology to measure carbon dioxide gas and shall be;
   1. Wall mounted carbon dioxide sensors shall be Veris CWE series or equivalent.
   2. Duct mounted carbon dioxide sensor shall be Veris CWD series or equivalent.
   3. The EMCS contractor shall utilize the required calibration devices to properly commission and calibrate the sensors per the manufacturer’s requirements.

C. Relative Humidity Sensors: relative humidity sensors shall be a two-wire type, 4-20 mA output proportional to the relative humidity range of 0-100%. The accuracy of the sensors shall be +/- 2% over a range of 10-90% RH.
   1. Outdoor relative humidity sensors: provide non-corroding outdoor shield to minimize wind effects and solar heating. Install wall-mount weather proof enclosure with conduit fitting. Sensor shall be Veris HO series, or equivalent.
   2. Wall-mounted relative humidity sensor: sensor shall be installed in a wall-mounted enclosure with white cover. Sensor shall be Veris HEW series or equivalent.
   3. Duct-mounted relative humidity sensor: sensor shall be provided with a moisture resistant enclosure with conduit fitting. The probe length shall be 8" minimum. Sensor shall be Veris HED series or equivalent.

D. Pressure Transducers:
   1. Air pressure transducer: The pressure transducer shall have an input range compatible with the medium being measured. The proportional output signal shall be 0-10 VDC or 4-20 mA. The accuracy shall be +/- 0.25% FS. Transducer shall be SETRA Model 264 or equivalent. Air pressure sensors and all associated tubing, hardware, and accessories shall be provided as appropriate for the application.
      a. Duct mounted pressure sensor shall be stainless steel and provided with mounting flange and hardware. The sensor probe length shall be appropriate for the associated duct dimensions.
      b. Wall mounted space pressure sensor shall include stainless steel wall plate, pressure pick up filter, and mounting hardware.
      c. Ceiling mounted space pressure sensor shall be paintable, low-profile type, with pressure pick up filter, integral surge dampener, and adhesive ring for ceiling mount.
      d. Outdoor pressure sensor shall include an outdoor rated sensor, 50 ft. of vinyl tubing, mounting bracket and hardware. A surge dampener shall also be provided for all outdoor pressure sensor applications to absorb pressure fluctuations.
   2. Water pressure transducer: The pressure transducers shall have an input range compatible with the medium being measured. The proportional output signal shall be 0-10 VDC or 4-20 mA. The accuracy shall be +/- 0.25% FS. Transducer shall be SETRA Model 230 or equivalent. Transducer shall be installed with a valved piping bypass and bleed off for each port. Water pressure sensors and all associated tubing, hardware, and accessories shall be provided as appropriate for the application.

E. Freezestat: Provide freezestats for all chilled water air handling systems that receive more than 10% untreated outside air. Freezestats shall provide vapor tension elements, which shall serpentine the inlet face on all coils. Provide additional sensors, wired in series, to provide one linear foot per square foot of coil surface area. Freezestat shall be manually reset at the switch. Interlock to the associated fan so that fan will shut down when HOA switch is in hand or auto position. Provide time delay relays with a 0-10 minute time delay relay duration to minimize nuisance freezestat trips. Time delay relay shall be adjustable at the associated control panel.

F. Air differential pressure switch: For fan shutdown, provide air differential pressure switches for all fans controlled by a variable frequency drive (VFD) to shut down the associated fan in the event of sensing high differential pressure. Air differential pressure switches shall have an adjustable setpoint with a range of 0-10 inches w.g. with manual reset at the switch. Provide ¼ inch copper tubing with compression fittings to mount to the side of the duct. Sensor shall be DWYER Series 1900 or equivalent.

G. Momentary control relays: Provide momentary control relays as indicated. Relays shall have coil ratings of 120 VAC, 50 mA or 10-30 VAC/VDC, 40 mA as suitable for the application. Contact ratings shall be 10 amp. Provide complete isolation between the control circuit and the digital output. Relays shall be located in the UC or other local enclosures and have pin-type terminals. Relays shall have LED indication of status.

H. Current sensing relay: Current sensing relays shall be rated for the applicable load. The output relay shall have an accessible trip adjustment over its complete operating range. Enclosure shall have an LED to indicate relay status.

I. Photocell: Ambient light level shall by a photocell in a non-corroding in a weatherproof housing with sun shield suitable for exterior installation. The control signal output shall be 4-20 ma or binary contact closure as specified in the sequences of operation. Mount the photocell on the north side of the building on the roof. The sensor reading shall be 0-750 foot-candles.

J. Occupancy Sensors
   1. Occupancy sensors shall be dual-technology, ceiling mounted type. Sensors shall be capable of detecting presence in the control area by via Doppler shifts in transmitted ultrasound and passive infrared (PIR) heat changes. Sensor shall utilize Dual Sensing Verification Principle for coordination between ultrasonic and PIR technologies. Detection verification of both technologies must occur in order to activate lighting systems. Sensor shall have a retrigger feature in which detection by either technology shall retrigger the lighting system on within 5 seconds of being switched off. The sensor shall operate at 24 VDC/VAC. WattStopper DT-300 or approved equal.
   2. Sensors shall have a time delay that is adjustable with configuration software or shall have a fixed time delay of 5 to 30 minutes, set by a DIP switch. Sensors shall feature a walk-through mode, where lights turn off 3 minutes after the area is initially occupied if no motion is detected after the first 30 seconds.
   3. The sensor shall have an additional single-pole, double throw isolated relay with normally open, normally closed and common outputs. The isolated relay is for use with HVAC control, data logging, and other control options. The sensor shall have an LED indicator that remains active at all times in order to verify detection within the area to be controlled.

2.13 HVAC VENTILATION SHUTDOWN SWITCH

A. The HVAC ventilation shutdown switch shall be a mushroom type switch, STI Series 2000 Stopper Station that complies with the following:
   1. Color shall be coordinated with the Owner prior to ordering.
   2. Latches when depressed.
   3. Twist to reset.
   4. Indoor/Outdoor flush type clear plastic cover.
   5. Switch label shall read "HVAC VENTILATION SHUTDOWN" or other label approved by the Owner. Coordinate final label text with the Owner prior to ordering.

B. Coordinate final location of shutdown switch with the Mechanical Drawings, the Architect, and the Owner prior to installation.

2.14 AIRFLOW MEASURING STATIONS (AFMS)

A. Duct mounted airflow measuring stations with combination airflow and air temperature measurement devices shall have the following features:
   1. Multi-point sensors in one or more probe assemblies with a maximum of one to sixteen sensor nodes per location, and a single remotely mounted microprocessor-based transmitter for each measurement location. Each sensor node shall consist of two hermetically sealed bead-in-glass thermistors. Each sensing point shall independently determine the airflow rate and temperature at each node, which shall be equally weighted in calculations by the transmitter prior to output as the cross-sectional average. Each ducted sensor probe shall have an integral, U.L. Listed, plenum rated cable. Each independent temperature sensor shall have a calibrated accuracy of +/-0.14° F (0.08° C) over the entire operating temperature range of -20° F to 160° F (-28.9° C to 71° C) and shall be calibrated at 3 temperatures against standards that are traceable to NIST. Acceptable manufacturer shall be EBTRON, Inc. GTx116-PC.
   2. Each transmitter shall have a display capable of simultaneously displaying both airflow and temperature. Airflow rate shall be field configurable to be displayed as velocity or volumetric rates, selectable as IP or SI units. Each transmitter shall operate on 24 VAC and be fused and protected from over voltage, over current and power surges.
   3. Each independent airflow sensor shall have a laboratory accuracy of +/-2% of Reading over the entire calibrated airflow range of 0 to 5,000 fpm (25.4 m/s) and shall be wind tunnel calibrated at 16 points against air velocity standards that are traceable to NIST.

2.15 DAMPERS:

A. Provide motorized volume control and shutoff dampers as detailed in 23 33 00 - Ductwork Accessories.

2.16 DAMPER ACTUATORS:

A. Outside and exhaust air damper actuators shall be mechanical spring return. The actuator mounting arrangement and spring return feature shall permit normally open or normally closed positions of the damper as required.

B. Outside and return air modulating actuators shall utilize analog (proportional) control 0-10 VDC. Actuators shall be driven in both the open and closed directions.

C. Electric damper actuators shall be direct shaft mounted and use a V-bolt and toothed V-clamp causing a cold weld effect for positive gripping. Single bolt or setscrew type fasteners are not acceptable.

D. Single section dampers shall have one electronic actuator direct shaft mounted.

E. Multi-section dampers with electric actuators shall be arranged so that each damper section operates individually. One electronic actuator shall be direct shaft mounted per damper section.

F. Damper actuators shall be BELIMO or equivalent.

2.17 CONTROL VALVES

A. Furnish all valves controlled by the EMCS as shown on the Mechanical Drawings. Furnish all automated isolation valves as shown on the Mechanical Drawings. Control valves shall be factory fabricated of type, body material, and pressure class based on maximum pressure and temperature rating of piping system, unless otherwise indicated. EMCS contractor to size control valve with a maximum of 3 psi pressure drop. 2-position isolation valves shall be full-line size.
   1. All chilled water, condenser water, and hot water valves shall meet, at minimum, the following ANSI Class 150 ratings. Valves 0.5 inch to 2 inches shall have NPT female screwed ends. Valves 2.5 inches and larger shall have flanged ends.
   2. Equal Percentage control characteristic shall be provided for all water coil control valves.

B. Pressure Independent Characterized Control Ball Valves ½" to 6", for two-way modulating applications shall have equal percentage characteristics and control the flow from 0 to 100% full rated flow with an operating pressure differential range of 5 to 50 PSI across the valve. The pressure independent control valve shall be provided and delivered from a single manufacturer as a complete assembly. The actuator shall be integrally mounted to the valve at the factory with a single screw on a direct coupled DIN mounting-base. All valve actuators shall be capable of being electronically programmed in the field by use of external computer software or a dedicated handheld tool for the adjustment of flow and/or temperature control. Programming using actuator mounted switches or multi-turn actuators are not acceptable. The control valves shall be sized for the scheduled flow and not pressure drop. Calibrated Balancing Valves and Automatic Flow-Control Valves shall be prohibited from use at coil circuit piping where pressure independent control valves are installed. Contractor shall provide a section of straight pipe five times the pipe diameter with respect to the nominal valve size upstream of the control valve assembly where utilizing integral flow sensor to guarantee sensor accuracy.
   1. NPS 3/4" and Smaller: Belimo PIQCV or equal. Forged brass body rated at no less than 360 PSI, stainless steel ball and blowout-proof stem, characterizing disc integral to ball, PTFE ball seat, dual EPDM lubricated O-rings, and female NPT union ends. Close off pressure rating of 100 psi. Integral pressure regulator located upstream of ball to maintain a constant pressure differential. Replaceable cartridge type regulators are not permitted.
   2. NPS 1" through 2": Belimo ePIV or equal. Forged brass, nickel-plated body rated at no less than 360 PSI, stainless steel ball and blowout-proof stem, PTFE ball seat, dual EPDM lubricated O-rings, stainless steel or TEFZEL characterizing disc, and female NPT union ends. Close off pressure rating of 200 psi. Valve shall be integrated with an electronic (ultra-sonic or electromagnetic) flow sensor (accuracy +/- 2%) providing analog flow feedback. The valve shall reposition to maintain the required flow with a +/- 5% accuracy over a pressure differential range of 1 to 50 psi.
   3. NPS 2-1/2" through 6": Belimo ePIV or equal. GG25 cast iron body according to ANSI 125, Class B, stainless steel ball and blowout-proof stem, PTFE ball seat, with a dual EPDM lubricated O-rings and a stainless steel flow characterizing disc. End connection pattern to match ANSI 125 flange. Close off pressure rating of 100 psi. Valve shall be integrated with an electronic (ultra-sonic or electromagnetic) flow sensor (accuracy +/- 2%) providing analog flow feedback. The valve shall reposition to maintain the required flow with a +/- 5% accuracy over a pressure differential range of 1 to 50 psi.

C. Characterized Control Ball Valves (CCV) for ½' to 2": for 3-way modulating applications shall have equal percentage characteristics. Manufacturer shall be Belimo or approved equal.

1. Valve housing shall consist of forged brass rated at no less than 400 psi at 250 °F. Three-way valves shall have EPDM O-rings behind ball seals to allow for a minimum close-off pressure of 40 psi with an actuator that provides 35 in-lbs torque for ½ to 2 in. sizes. Three-way valves shall be installed in a “tee” configuration with actuator perpendicular to the shaft. Confirm mixing or diverting application for correct valve selection.

D. Globe Valves 2-1/2” to 6”: for 3-way modulating applications shall have equal percentage characteristics. Manufacturer shall be Belimo G7 series or approved equal.
   1. Valve housing shall consist of cast iron rated at no less than 125 psi at 300 °F. Valve shall have stainless steel stem, plug and seat. Three-way valves shall be installed in a “tee” configuration with actuator perpendicular to the shaft. Confirm mixing or diverting application for correct valve selection.

E. Butterfly valves: For chiller and cooling tower isolation control valves, butterfly control valves may be provided.
   1. Butterfly Isolation valves shall be line-size. Design velocity shall be less than 12 feet per second when used with standard EPDM seats. Butterfly valves shall have ductile iron body, 304 stainless steel disc and EPDM seat. The valve body close-off pressure rating shall be 150 psi over a range of -20 F to 250 F. The flange shall be ANSI 125/250. Belimo F6 and F7 series or approved manufacturer.

F. Actuators for characterized control valves and globe valves: Provide electric actuators for all control valves that are furnished as part of the EMCS contract. Two-way and three- way control valve actuators shall meet, at minimum, the following requirements:
   1. Motor driven type with gear assembly made of hardened steel. Actuator shall have an input voltage of 24 VAC. Provide visual mechanical position indication.
   2. Actuators installed within the interior of the building envelope shall be provided with NEMA-2 rated housings.
   3. Actuators installed exterior to the building envelope shall be provided with NEMA-4 rated housings or a weather shield. All penetrations through exterior actuator housings shall be provided with fittings that prevent water ingress.
   4. Valves shall be sized to meet the shut-off requirements when operating at the maximum system differential pressure and with the installed system pump operating at shut-off head. Actuators shall control against system maximum working pressures.
   5. Normal and failure positions shall be as indicated in the operating sequences. Provide spring return action per the sequences.
   6. Manual declutch lever to enable manual operation of the valve. It shall be possible for an operator to manually modulate valves located in mechanical rooms in the event of loss of power.
   7. Overload Protection: Actuators shall provide protection against actuator burnout by using an internal current limiting circuit or digital motor rotation sensing circuit. Circuit shall insure that actuators cannot burn out due to stalled damper or mechanical and electrical paralleling. End switches to deactivate the actuator at the end of rotation are acceptable only for butterfly valve actuators.
   8. All actuators shall be capable of being electronically programmed in the field by use of external computer software or a dedicated handheld tool for the adjustment of flow. Programming using actuator mounted switches or multi-turn actuators are not acceptable.
   9. Electric actuators shall be Belimo, compatible with the valves furnished.

G. Butterfly Valve Industrial Actuators
   1. Enclosure shall be NEMA 4 (weatherproof) enclosure and will have an industrial quality coating.
   2. Actuator shall have a motor rated for continuous duty. The motor shall be fractional horsepower; permanent split capacitor type designed to operate on a 120 VAC, 1 phase, 60 Hz supply. Two adjustable cam actuated end travel limit switches shall be provided to control direction of travel. A self-resetting thermal switch shall be imbedded in the motor for overload protection.
   3. Reduction gearing shall be designed to withstand the actual motor stall torque. Gears shall be hardened alloy steel, permanently lubricated. A self-locking gear assembly or a brake shall be supplied.
   4. Actuator shall have a 6 ft wiring harness provided for ease in field wiring (above 1500 in-lbs). Two adjustable SPDT cam-actuated auxiliary switches, rated at 250 VAC shall be provided for indication of open and closed position. Actuator shall have heater and thermostat to minimize condensation within the actuator housing.
   5. Actuator shall be equipped with a hand wheel for manual override to permit operation of the valve in the event of electrical power failure or system malfunction. Hand wheel must be permanently attached to the actuator and when in manual operation electrical power to the actuator will be permanently interrupted. The hand wheel will not rotate while the actuator is electrically driven.
   6. The actuator shall be analog, floating, or two position as called out in the control sequence of operation. All analog valves shall be positive positioning, and respond to a 2-10 VDC, 4-20 mA, or adjustable signal as required. Analog actuators shall have a digital control card allowing any voltage input for control and any DC voltage feedback signal for position indication.
   7. Butterfly valve actuators shall be Belimo furnished with specified butterfly valves.

2.18 REFRIGERANT LEAK DETECTION:

A. Refrigerant leak detection monitors shall be provided for the refrigerant and number of chillers installed.
   1. Power consumption: AC - 325 mA, DC - 250 mA. Volt free contacts to indicate an alarm condition.
   2. Operating temperature range of 32 °F to 105 °F. Operating humidity range of 0 to 95% non-condensing.
   3. Measuring range of 0-1000 ppm proportional to 4 to 20mA output range for each sampling point.
   4. System shall detect the presence of the types of refrigerants provided with the chillers using sequential sampling and multi-point monitoring method.
   5. System shall annunciate to the EMCS through a contact closure and have a local alarm (audible and visual) Control panel shall have a silencing alarm button. Signage at all entry points to the chiller room shall be installed. Initial alarm shall comply with recommended Allowable Exposure Level (AEL). Adjustable 3 level alarm for each point shall be supplied with common alarm output contacts. Provide local digital indication of ppm level for a minimum of 1 sample point per chiller. A sample point shall be located close to each chiller and the refrigerant pump out unit location. Location to be approved by the engineer. Sample point if in alarm shall flash the associated LED. Provide local alarm horns and visual (stroboscopic) beacons at the following locations to activate upon alarm to an approved detail:
      a. Outside of entrance doors to chiller machine room.
      b. Inside rooms without an escape route other than through the chiller room.
      c. At each chiller location.

d. At any other location in the chiller room as necessary to ensure that a person at any location in the chiller room and room that can be entered from the chiller room can see the visual alarm and hear the audible alarm and at any other location required to meet the applicable codes.

6. System shall shut down all electrical equipment (chiller systems and associated pumps, AHU, FCU, etc.) and sequence emergency extract equipment as required to meet regulations. Where combustion equipment is employed, refrigerant vapor monitoring system shall automatically shut down the combustion process in event of refrigerant leakage if other alternative acceptable conditions are not applied. Ventilation system, chiller and associated pumps and other equipment shut down as a result of the refrigerant leak alarm shall return to normal operation when the refrigerant monitoring system is no longer detecting refrigerant levels above set points and alarms have been silenced.
7. System shall have self-diagnostics and supply common malfunction output. Loss of sample flow at either sample or ZERO line and electrical malfunction shall annunciate to the EMCS.
8. Provide two (2) additional particulate filters and zero gas filter cartridges.
9. Provide an emergency shut-off control button outside each chiller plant room entrance/exit door. Button shall be mounted at 48 inches above finished floor adjacent to refrigerant leak detection alarm light. Activation of any one of the buttons shall de-energize all chillers and other electrical equipment within the chiller plant room. Button shall be manually reset.
10. Provide BACnet MS/TP interface to EMCS. Provide Strobe/Horns and Emergency Push Buttons.
11. Maximum System Maintenance Requirements - The system shall require no periodic maintenance other than periodic checking. Periodic checking or adjustments of the unit shall be capable of being accomplished by one person at the unit location.
12. Manufacturer Capability Requirements - As a minimum, the Gas Monitoring Equipment manufacturer must meet the following requirements:
    a. Be capable of supplying all equipment used to check or calibrate the unit
    b. Be capable of providing onsite service with factory trained personnel
    c. Be capable of providing start-up assistance and training for the owner/operator
13. Gas Monitoring System shall be a Mine Safety Appliances Company Chillgard RT Refrigerant Monitor or equal.

2.19 PANELS AND ENCLOSURES

A. Provide panels and enclosures for all components of the EMCS, which are susceptible to physical or environmental damage.

B. Interior panels and enclosures shall meet be NEMA 1 rated painted steel panels with locking door.

C. Exterior mounted panels and enclosures shall be NEMA 4 painted steel panels with locking door.

D. Panels for USCs shall be mounted on the outside of all unit ventilators and fan coil units with three feet of wall clearance in front of them and no higher than 7 feet to the bottom of the panel.

2.20 LABELING AND WARNING NOTICES

A. Provide labeling for all control panels and enclosures.

B. Provide labeling of all control wires and input/output points at the controller and at the control device; the label at each end of the wire shall be the same Labels shall be machine generated, typed and clearly legible with a maximum of 17 characters. Hand written labels or labels written on the control wire jacket will not be acceptable. Each label shall be unique to its function and shall reference the applicable system. For example “AHU-1 SAT” will indicate the supply air temperature sensor for AHU-1. Improper labeling shall be removed and shall require re-commissioning of the control device and controller to document correct functionality.

C. Provide high voltage warning notices at all equipment controlled by the EMCS and at all associated motor starters when used by equipment controller.

2.21 TUBING AND PIPING

A. Provide tubing and piping as required for the field instrumentation.

B. Tubing within equipment rooms, vertical risers, and penetrations to ductwork shall be either copper pipe or shall be plastic tubing within conduit. Tubing for all water-based instrumentation shall be copper pipe. Identify the type of tubing proposed in the shop drawing submittal.

C. Provide suitable bulk head fittings for duct and panel penetrations.

D. Tubing in plenum rated areas may be plastic tubing. Polyethylene tubing shall meet, at minimum, the following requirements: flame retardant; crack resistant; 300 psi burst pressure.

2.22 CONDUIT AND FITTINGS

A. Provide all conduits, raceways and fittings for the EMCS monitoring, communication and control cabling. All work shall meet all applicable codes.

B. Conduit, where required, shall meet, the requirements specified within Division 26.

C. EMCS monitoring and control cable shall not share conduit with cable carrying voltages in excess of 90 VAC.

2.23 CABLING

A. Provide all cables for the EMCS. Cable shall meet, at minimum, the following requirements:
   1. Minimum 98% conductivity stranded copper.
   2. Proper impedance for the application as recommended by the EMCS component manufacturer.
   3. Monitoring and control cable shall be #18 AWG or larger, dependent on the application. Analog input and output cabling shall be shielded.
   4. Management Level Network cable shall be CAT 6, 24 gauge unshielded.
   5. Automation Level Network cable shall be #24 AWG shielded.
   6. Shield shall be grounded at the CCP, UC, or control panel. Ground at one end only to avoid ground loops.
   7. Identification of each end at the termination point. Identification should be indicated on and correspond to the record drawings.

B. 120 VAC power wiring shall be of #12 AWG solid conductor or larger as required.

PART 3 - EXECUTION

3.1 PRE-CONSTRUCTION

A. The EMCS supplier shall provide a pre-construction coordination meeting with the affected trades to ensure a cooperative efficient process of installation. The invited trades shall include the general contractor, mechanical contractor, electrical contractor, test and balance contractor, commissioning provider, owner's representative, consulting engineer and others with a direct interest in the coordination of the affected systems. The EMCS contractor shall provide an outline of the meeting agenda highlighting the construction schedule, coordination with mechanical and electrical trades. Provide a sign-in sheet and submit it through the attendees along with a summary of the meeting notes for future reference.

3.2 INSPECTION DURING INSTALLATION

A. Provide a technician to assist the Engineer or Owner's Representative with inspections made during the installation period that are required to review the progress and quality of ongoing work. The engineer/owner's representative shall generate field observation reports on the findings of the inspection. The engineer or owner's representative shall advise the EMCS contractor during the inspection of any concerns noted with respect to the installation and shall repeat the concerns in writing as soon as possible after the inspection is completed. The EMCS contractor shall take corrective action to meet the requirements of the specifications. Upon correction, the EMCS contractor shall submit written documentation through the contractors to the engineer.

3.3 INSTALLATION OF COMPONENTS

A. Provide all interlock and control wiring. All wiring shall be installed in a neat and professional manner in accordance with specification Division 26 and all national, state and local electrical codes.

B. Provide wire and wiring techniques recommended by equipment manufacturers. Control wiring shall not be installed in power circuit raceways. Magnetic starters and disconnect switches shall not be used as junction boxes. Provide auxiliary junction boxes as required. Coordinate location and arrangement of all control equipment with the Owner's Representative prior to rough-in. Provide auxiliary pilot duty relays on motor starters as required for control function.

C. Electrical Contractor shall provide 120 or 277 volt power at a junction box within 48" of the controller. The BAS Contractor shall coordinate with the Electrical Contractor to identify locations of power requirements prior to the installation of the controls.

D. Conduit for control wiring shall be provided whenever one of the following conditions exists:
   1. Conduit is indicated on the drawings or specifically required by the specifications.
   2. Cabling runs through inaccessible areas such as within partitions/walls, above closed in ceilings, under floor; within trenches and underground; on the exterior of the building; exposed on the surface of the building; when encased in concrete or other material that makes the cable inaccessible or when located such that access to the cable is not readily obtained.
   3. Cable within mechanical, telecommunications and electrical equipment rooms and control rooms.
   4. Conduit shall be installed, inside wall from sensor box to above the wall, for all wall mounted temperature, humidity and CO2 sensors.

E. Control wiring located above an accessible ceiling space may be plenum rated cable. Plenum rated wire shall be bundled and routed at right angles to the building lines and secured to the building structure every 15 feet.

F. Control wiring located in underground conduits shall be provided with direct-burial-rated insulation.

G. When communication bus enters or exits a building, a surge suppressor shall be installed. The surge suppressor shall be installed according to the controls manufacturer's instructions.

H. Provide sleeves for all cable and conduit passing through walls, partitions, structural components, floors and roof

I. All sensor wiring shall be labeled to indicate the origination (at the device) and destination of data (at the control panel). The description shall indicate the type and location of the control device such as "AHU-1 SA temp" or "VAV 1-1 space temp".

J. Wall temp sensors at 48" above the finished floor to comply with ADA requirements and to match the height of the light switches. Mount humidity sensor at equal height to wall temperature sensor.

K. Outdoor pressure sensors shall be installed a minimum of five feet above the roof surface and shall be free of immediate obstructions and sources of turbulence that could affect pressure readings. Sensors shall be attached to the top of roof mounted equipment or provided with stand-alone vertical support if no roof mounted equipment is available. Sensor tubing shall be routed into the building through a sealed weathertight penetration. Provide a heat trap loop in the sensor tubing immediately below the roof.

3.4 VERIFICATION REQUIREMENTS

A. Verification shall be provided by the EMCS contractor to demonstrate and confirm that the installed system complies with the specifications and the control sequences of operation herein specified. upon completion of the verification process the EMCS contractor shall demonstrate to the engineer or owner's representative the functionality of the control system devices are in compliance with the contract documents.

B. Technicians provided by the EMCS contractor shall be factory trained and qualified in the operation of the provided control system. The EMCS contractor shall provide, if requested, the factory training certificates of the individuals providing the verification services on this project.

C. Verification tools, applicable to the system provided, shall be utilized by the factory-trained technicians for proper verification of system operation and functionality. Temperature verification sensors shall be NIST certified within the last 12 months. Meters such as Fluke 52 series or better shall be utilized. Use of non-certified meters may require the system to be re-verified with certified meters at no cost to the owner.

D. Documentation of the verification process shall be provided per the project general conditions in electronic PDF format as required. Documentation shall include the following forms:
   1. Project System Verification Forms for each controller provided on the project to verify the proper function of each controller, control device and system component provided.
   2. Panel Verification Forms for each control panel to document the proper installation and function of each control panel provided.

3. Sequence of Operation Verification Forms for each piece of controlled equipment to confirm compliance of the control system with the specified sequences of operation.
4. Not providing proper documentation for each control devices, panel, or system, upon request by the engineer or owner's representative, may require the EMCS contractor to re-verify the applicable systems at no additional cost to the owner.

E. After completion of the verification, the EMCS contractor shall be able to demonstrate the sequence of operations for each system to the engineer and the owner's representative.

F. Equipment checkout sheets are to be produced by this contractor showing checkboxes and compliance with the following procedures for each piece of equipment and turned over to the owner and/or mechanical engineer.

3.5 COLORGRAPHICS

A. The colorgraphics shall be provided for the EMCS system prior to system acceptance and owner training.

B. The colorgraphics provided shall include the following as a template. Provide forward and backward links on the graphic.
1. Site plan with link to overall building plan including detached buildings. The site plan shall be referenced to an automatically updated aerial view or map view of the area such as Google Maps or Bing Maps. Provide link to proceed to the overall building floor plan.
2. The overall building plan shall indicate space temperature conditions referenced by the color of the zone. Specific details of the zone temperatures and equipment are not required. Provide a link to the floor plan wings, upper floors and remote buildings.
3. The floor plan colorgraphics shall indicate the space temperatures by color references. Additional information shall indicate the space temperature, the occupancy of the zone, air handling units, VAV terminals and ductwork with diffusers. A link at each terminal unit or AHU shall automatically connect the system operator to the equipment colorgraphic.
4. The colorgraphics for the equipment shall as a minimum be equal to the points from the input/output summary or control schematic. Primary control devices as required by the sequences of operation shall also be provided.
5. Control points from equipment that are integrated into the EMCS via BACnet shall be provided to convey the operating conditions of the attached equipment. Coordination of the integration points shall be accomplished during the submittal phase. The EMCS contractor shall provide a list of all integrated points on their submittal.

3.6 CONTROL SYSTEM DEMONSTRATION AND ACCEPTANCE

A. Startup testing documentation: Prepare the checklist documenting startup testing of each input and output device, with technician's initials and date certifying each device has been tested and calibrated prior to acceptance testing. This document shall indicate proof that the following functions have been commissioned and shall be included in the as-built documentation: short to ground check, configuration of trends, confirmation that color-graphics are accurately representing actual systems, point to point checkout, all damper and valve actuators respond to input change, control modules are addressed and have functional descriptors, specified interlocks are functional, calibration report of all sensors, discrete outputs respond to time schedule or manual enable command.

B. Demonstration. Prior to acceptance, demonstrate the following performance tests to demonstrate system operation and compliance with specifications.
   1. Engineer, owner's representative and mechanical contractor shall be invited to observe and review system demonstration. Provide attendees at least 10 days notice.
   2. Demonstration shall follow process approved as part of the submittal and shall include complete checklists and forms for each system as part of system demonstration.
   3. Demonstrate actual field operation of each sequence of operation as specified. Demonstrate calibration and response of any input and output points requested by engineer or owner's representative.
   4. Demonstrate complete operation of operator interface including review of color-graphics, time schedules, trend logs, alarm notification, functionality of tablet PC operation.
      a. PID loop response. Supply graphical trend data output showing each PID loop's response to a set point change representing an actuator position change of at least 25% of full range. Trend sampling rate shall be selectable from 10 seconds to 3 minutes, depending on loop speed. Each sample's trend data shall show set point, actuator position, and controlled variable values.
      b. Demand limiting. Supply trend data output showing demand-limiting algorithm action. Trend data shall document action sampled each minute over at least a 30-minute period and shall show building kW, demand limiting setpoint, and status of set points and other affected equipment parameters.
      c. Trend logs for each system. Trend data shall indicate set points, operating points, valve positions, and other data as specified. Logs shall be accessible through system's operator interface and shall be retrievable for use in other software programs.
   5. Alarms and Interlocks. Check each alarm with an appropriate signal at a value that will trip the alarm. Trip interlocks using field contacts to check logic and to ensure that actuators fail in the proper direction. Alarm verification shall include temperatures exceeding alarm threshold (high and low), fan failure safety, duct high static pressure switch, freezestat, and smoke detector shutdown.
   6. Tests that fail to demonstrate proper system operation to the engineer shall be repeated after contractor makes necessary repairs or revisions to hardware or software to successfully complete each test.

C. Owner Acceptance.
   1. After tests described in this specification are performed to the satisfaction of both engineer and owner's representative, the engineer shall accept the control system as meeting completion requirements. Engineer may exempt tests from completion requirements that cannot be performed due to circumstances beyond EMCS contractor's control. Engineer shall provide written statement of each exempted test. Exempted tests shall be performed as part of warranty.
   2. System shall not be accepted until completed demonstration forms and checklists are submitted and approved by the engineer.

3.7 DEMONSTRATION AND OWNER TRAINING

A. Furnish basic operator training for multiple persons on data display, alarm and status descriptors, requesting data, execution commands and log requests. Include a minimum of 16 hours: 8 hours instructor time for onsite training and 8 hours of hands on class environment training. Training sessions may be provided in 4-hour increments as approved by the owner's representative.
   1. Change/modify temperature setpoints.
   2. Change/modify time of day, holiday and override schedules.

3. Display, create, and modify trends of system points.
4. Update room numbers on the color-graphics.

B. Demonstrate complete and operating system to Owner. Provide written documentation listing the attendees of the specified training with sign-in sheet and training time and date.

3.8 SEQUENCE OF OPERATIONS

A. Refer to the Mechanical Drawings for project control schematics and sequence of operations.

END OF SECTION 23 09 63

SECTION 23 21 13 - ABOVE GROUND HYDRONIC PIPING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. Section 23 02 00 - Basic Materials and Methods for HVAC shall be included as a part of this Section as though written in full in this document.

1.2 WORK INCLUDED

A. Pipe and pipe fittings.

B. Condenser water piping system.

C. Condensate drain piping.

1.3 RELATED WORK

A. Section 23 05 29 - Hangers and Supports for Piping and Equipment - HVAC

B. Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment

C. Section 23 05 53 - Identification for HVAC Piping and Equipment

D. Section 23 07 19 - HVAC Piping Insulation

1.4 REFERENCES

A. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2016.

B. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings: DWV; 2021.

C. ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder-Joint Drainage Fittings—DWV; 2022.

D. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators; 2025.

E. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2025.

F. ASTM B32 - Standard Specification for Solder Metal; 2020.

G. ASTM B306 - Standard Specification for Copper Drainage Tube (DWV); 2020.

H. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2023.

I. ASTM D1784 - Standard Classification System and Basis for Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds; 2020.

J. ASTM F493 - Standard Specification for Solvent Cements for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings; 2022.

K. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2024.

L. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2025.

M. ANSI/AWWA C110 - Ductile-Iron and Gray-Iron Fittings 3 in. through 48 in., for Water and Other Liquids.

N. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

O. ASTM B32 - Solder Metal.

P. ASTM B88 - Seamless Copper Water Tube.

1.5 QUALITY ASSURANCE

A. Foreign made pipes, valves and fittings will not be acceptable.

B. Valves: Manufacturer's name and pressure rating marked on valve body.

C. Welding Materials and Procedures: Conform to ASME BPVC-IX and applicable state labor regulations.

D. Welder’s Certification: In accordance with ASME BPVC-IX.

1.6 SUBMITTALS

A. Submit product data under provisions of Division One.

B. Include data on pipe materials, pipe fittings, valves, and accessories.

C. Include welder’s certification of compliance with ASME BPVC-IX.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Division One.

B. Store and protect products under provisions of Division One.

C. Deliver and store valves in shipping containers with labeling in place.

D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

E. Protect piping systems from entry of foreign materials by temporary covers, proper storage and dunnage, completing sections of the work, and isolating parts of completed system. Tape will not be allowed as an acceptable end cover.

PART 2 - PRODUCTS

2.1 EQUIPMENT DRAINS AND OVERFLOWS

A. Interior to the Building: Copper Tubing: ASTM B306, DWV.
   1. Fittings: ASME B16.23 cast copper alloy solder joint drainage fittings (DWV), or ASME B16.29 wrought copper and wrought copper alloy solder joint drainage fittings (DWV).
   2. Joints between copper pipe and fittings shall be made in accordance with ASTM B828 using ASTM B32 Alloy Grade Sn 50 solder (50-50 tin-lead).

B. Exterior to the Building: CPVC Pipe and Fittings: ASTM D1784, Schedule 40.
   1. Fittings: ASTM D1784, Schedule 40 fittings.
   2. Joints: Solvent weld with ASTM F493 solvent cement.
   3. Paint all CPVC drain piping with UV resistant paint, light color.

PART 3 - EXECUTION

3.1 CONDENSATE DRAIN PIPING

A. Drain piping from each unit shall be extended to the nearest floor drain or condensate drainage system. Drains shall be of the size indicated but not less than the full size of the drain pan connections.

B. Use plugged tees in lieu of elbows.

C. Slope all drain lines 1/8" per foot, minimum.

D. Provide auxiliary drain pan on all AHU's above ceiling with auxiliary drain line routed to discharge in visually prominent area. Discharge location shall be coordinated with Architect.

E. All drain piping located outside the building shall be painted with a light colored, UV resistant paint.

3.2 PIPE FABRICATION AND INSTALLATION

A. All pipes shall be cut accurately to measurements established at the site and shall be worked into place without springing or forcing.

B. Piping layout and installation shall be made in the most advantageous manner possible with respect to headroom, valve access, opening and equipment clearance, and clearance from other work. Particular attention shall be given to piping in the vicinity of equipment; layout shall be made in such manner as to preserve maximum access to the various equipment parts for maintenance.

C. All changes in directions shall be made with fittings; field bending and mitering of pipe is prohibited.

D. Air vents and air chambers shall be installed as hereinafter specified.

3.3 OFFSETS AND FITTINGS

A. Due to the small scale of the Drawings, it is not possible to indicate all offsets, fittings, etc. which may be required. The Contractor shall carefully investigate structural and finish conditions affecting the Work, and shall take such steps as may be required to meet such conditions at no additional cost to the Owner.

B. All piping shall be installed close to walls, ceilings and columns, (consistent with the proper space for covering, removal of pipe and special clearances), so as to occupy the minimum of space, and all offsets, fittings, etc., required shall be provided at no additional cost to the Owner.

3.4 SECURING AND SUPPORTING

A. All piping shall be adequately supported to line and grade, with due provisions for expansion and contraction.

B. Piping shall be supported on approved clevis type, split ring, or trapeze type hangers properly connected to the structural members of the building.

C. All insulated piping shall be fitted with suitable steel protection saddles.

D. Perforated bar hangers, straps, wire or chains will not be permitted.

END OF SECTION 23 21 13

SECTION 23 31 13 - METAL DUCTWORK

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Low pressure ductwork.

B. Commercial dryer vent.

C. Duct leakage testing.

D. Duct system protection.

E. Duct system cleaning.

1.2 RELATED SECTIONS

A. Division 9 - Finishes: Weld priming, weather resistant, paint or coating.

B. Section 23 02 00 - Basic Materials and Methods for HVAC

C. Section 23 05 29 - Hangers and Supports for Piping and Equipment - HVAC

D. Section 23 05 93 - Testing, Adjusting, And Balancing

E. Section 23 07 13 - Duct Insulation

F. Section 23 33 00 - Ductwork Accessories

G. Section 23 37 13 - Air Distribution Devices

1.3 REFERENCES

A. ASTM A480/A480M - Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip; 2025a.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

C. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

D. NADCA ACR - The NADCA Standard for Assessment, Cleaning, and Restoration of HVAC System; 2021.

E. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

F. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; Current Edition, Including All Revisions.

G. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual.

H. ASHRAE (FUND) ASHRAE Handbook - Fundamentals; Chapter 21 - Duct Design.

I. ASHRAE (HVACS) ASHRAE Handbook - HVAC Systems and Equipment; Chapter 19 - Duct Construction.

J. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings.

K. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems.

L. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems.

M. ICC (IECC) - International Energy Conservation Code.

1.4 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of metal ductwork products of types, materials and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer's Qualifications: Firms with least 3 years of successful installation experience on projects with metal ductwork systems similar to that required for project.

1.5 GENERAL DESCRIPTION

A. Extent of metal ductwork is indicated on drawings and in schedules, and by requirements of this section.

1.6 SUBMITTALS

A. Submit shop drawings, duct fabrication standards and product data under provisions of Division One.

B. Indicate duct fittings, particulars such as gauges, sizes, welds, and configuration prior to start of work.

C. The contract documents are schematic in nature and are to be used only for design intent. The contractor shall prepare sheet metal shop drawings, fully detailed and drawn to scale, indicating all structural conditions, all plumbing pipe and light fixture coordination, and all offsets and transitions as required to permit the duct to fit in the space allocated and built. All duct revisions required as a result of the contractor not preparing fully detailed shop drawings will be performed at no additional cost.

1.7 DEFINITIONS

A. Duct Sizes: Inside clear dimensions. For lined ducts, maintain indicated clear size inside lining. Where offsets or transitions are required, the duct shall be the equivalent size based on constant friction rate.

B. Low Pressure: Low pressure ductwork shall be rated for an operating pressure of 2". Low pressure ductwork shall be defined as all return, exhaust, and outside air ducts, all supply ductwork associated with constant volume air handling units with a scheduled external static pressure of less than 2", and all supply ductwork downstream of terminal units in variable volume systems.

C. Medium Pressure: Medium pressure ductwork shall be rated for an operating pressure of 4”. Medium pressure ductwork shall be defined as all supply ductwork extending from variable volume air handling units to terminal units in variable volume systems with air handling units having a scheduled external static pressure of less than 4”. The supply ductwork of constant volume air handling units having a scheduled external static pressure greater than 2” and less than 4” shall be rated for medium pressure.

D. High Pressure: High pressure ductwork shall be rated for an operating pressure of 6”, or the scheduled external pressure of the equipment it is connected to, whichever is greater. The supply ductwork of air handling units having a scheduled external static pressure greater than 4” shall be high pressure.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protection: Protect shop-fabricated and factory-fabricated ductwork, accessories and purchased products from damage during shipping, storage and handling. Prevent end damage and prevent dirt and moisture from entering ducts and fittings, use sheet metal end caps on any lined duct exposed to the weather.

B. Storage: Where possible, store ductwork inside and protect from weather. Where necessary to store outside, store above grade and enclose with waterproof wrapping.

PART 2 - PRODUCTS

2.1 DUCTWORK MATERIALS

A. Exposed Ductwork Materials: Where ductwork is indicated to be exposed to view in occupied spaces, provide materials which are free from visual imperfections including pitting, seam marks, roller marks, stains and discolorations, and other imperfections, including those which would impair painting.

B. Sheet Metal: Except as otherwise indicated, fabricate ductwork from galvanized sheet steel complying with ASTM A653/A653M.

C. Stainless Steel Sheet: Where indicated, provide stainless steel complying with ASTM A480/A480M; Type 316; with No. 4 finish where exposed to view in occupied spaces, No. 1 finish elsewhere. Protect finished surfaces with mill-applied adhesive protective paper, maintained through fabrication and installation.

D. Aluminum Sheet: Where indicated, provide aluminum sheet complying with ASTM B209, Alloy 3003, Temper H14.

2.2 MISCELLANEOUS DUCTWORK MATERIALS

A. General: Non-combustible and conforming to UL 181, Class 1 air duct materials.

B. Flexible Ducts: Flexmaster U.S.A., Inc. Type 5M, Thermaflex MKE, ATCO #036 or approved equal.
   1. Flexible ducts shall be corrosive resistant galvanized steel formed and mechanically locked to inner fabric with minimum 1-1/2" thick, R-6 insulation. Flexible duct shall be rated up to at least 10 in.w.g. positive pressure and shall have reinforced metalized outer jacket to comply with UL 181, Class 1 air duct.

C. Sealants: Hard-Cast “iron grip” or approved equal, non-hardening, water resistant, fire resistive and shall not be a solvent curing product. Sealants shall be compatible with mating materials, liquid used alone or with tape or heavy mastic.

D. Ductwork Support Materials: Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, rods, straps, trim and angles for support of ductwork.
   1. For exposed stainless steel ductwork, provide matching stainless steel support materials.
   2. For aluminum ductwork, provide aluminum support materials.

2.3 LOW PRESSURE DUCTWORK

A. Fabricate and support in accordance with latest SMACNA (DCS) Standards and ASHRAE handbooks, except as indicated. Provide duct material, gauges, reinforcing, and sealing for operating pressures indicated.

B. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts. No variation of duct configuration or sizes permitted except by approved shop drawings. Obtain engineer’s approval prior to using round duct in lieu of rectangular duct.

C. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows are used, provide airfoil-turning vanes. Where acoustical lining is indicated, provide turning vanes of perforated metal with glass fiber insulation.

D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible. Divergence upstream of equipment shall not exceed 30 degrees; convergence downstream shall not exceed 45 degrees.

E. Use crimp joints with bead for joining round duct sizes 6 inch smaller with crimp in direction of airflow.

F. Use double nuts and lock washers on threaded rod supports.

2.4 EXPOSED DUCTWORK LOCATED INDOORS

A. Where ductwork is indicated to be exposed to view in occupied spaces, provide round or flat oval, double wall galvanized steel construction with spiral lockseam, United McGill Corporation model Acousti-k27 or approved equal.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

A. Obtain manufacturer's inspection and acceptance of fabrication and installation of ductwork at beginning of installation.

B. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pitot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.

C. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

D. Connect terminal units to medium or high pressure ducts with 18 inches maximum length of flexible duct. Do not use flexible duct to change direction.

E. Connect diffusers or troffer boots to low pressure ducts with 5 feet maximum, 4 feet minimum, length of flexible duct. Hold in place with strap or clamp.

F. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

G. The interior surface of all ductwork shall be smooth. No sheet metal parts, tabs, angles, or anything else may project into the ducts for any reason, except as specified to be so. All seams and joints shall be external.

H. All ductwork located exposed on roof shall be "crowned" to prevent water from ponding. Ref: Insulation for additional requirements.

I. Where ducts pass through non-rated floors, provide structural angles for duct support. Where ducts pass through non-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches. Where ducts pass through rated interior partitions, rated exterior walls, or rated floors, install fire dampers or smoke dampers as required. Provide sleeves for dampers not provided with factory sleeve. Refer to Section 23 33 00 - Ductwork Accessories for fire and smoke damper requirements.

J. All angles shall be carried around all four sides of the duct or group of ducts. Angles shall overlap corners and be welded or riveted.

K. All ductwork shall be fabricated in a manner to prevent the seams or joints being cut for the installation of grilles, registers, or ceiling outlets.

L. All duct hangers shall be attached to building structure. Cutting slots in roof or floor decking for hanger straps to be cast in concrete is not acceptable.

3.2 INSTALLATION OF FLEXIBLE DUCTS

A. Maximum Length: For any duct run using flexible ductwork, do not exceed 5'-0" extended length.

B. Installation: Install in accordance with Section III of SMACNA (DCS).

3.3 DUCTWORK APPLICATION SCHEDULE

A. Ductwork materials shall be provided to comply with the following:

AIR SYSTEM	MATERIAL
Low Pressure Supply	Galvanized Steel, Aluminum
Buried Supply or Return	Concrete, Glass Fiber Reinforced Plastic
Medium and High Pressure Supply	Galvanized Steel
Return and Relief	Galvanized Steel, Aluminum

General Exhaust	Galvanized Steel, Aluminum
Kitchen Hood Exhaust	Carbon Steel, Stainless Steel
Dishwasher/Shower/Locker Room/Dryer Vent/Paint Hood Exhaust	Stainless Steel
Fume Hood Exhaust	Carbon Steel, Stainless Steel, Glass Fiber Reinforced Plastic if not in air plenum
Welding Exhaust	Carbon Steel
Outside Air Intake	Galvanized Steel
Combustion Air	Galvanized Steel
Emergency Generator Ventilation	Carbon Steel

3.4 DUCTWORK HANGERS AND SUPPORTS

A. All ductwork shall be properly suspended or supported from the building structure. Hangers shall be galvanized steel straps or hot-dipped galvanized rod with threads pointed after installation. Strap hanger shall be attached to the bottom of the ductwork, provide a minimum of two screws one at the bottom and one in the side of each strap on metal ductwork. The spacing, size and installation of hangers shall be in accordance with the recommendations of the latest SMACNA edition.

B. All duct risers shall be supported by angles or channels secured to the sides of the ducts at each floor with sheet metal screws or rivets. The floor supports may also be secured to ducts by rods, angles or flat bar to the duct joint or reinforcing. Structural steel supports for duct risers shall be provided under this Division.

3.5 AIR DUCT LEAKAGE: (FROM SMACNA DUCT STANDARDS LATEST EDITION) TEST ALL DUCTWORK (DESIGNED TO HANDLE OVER 1,000 CFM) AS FOLLOWS:

A. Test apparatus
   1. A source of high pressure air-a portable rotary blower or a tank type vacuum cleaner.
   2. A flow measuring device consisting of straightening vanes and an orifice plate mounted in a straight tube with properly located pressure taps. Each orifice assembly shall be accurately calibrated with its own calibration curve. Pressure and flow readings shall be taken with U-tube manometers.

B. Test Procedures
   1. Test for audible leaks as follows:
   2. Close off and seal all openings in the duct section to be tested. Connect the test apparatus to the duct by means of a section of flexible duct.
      a. Start the blower with its control damper closed.
      b. Gradually open the inlet damper until the duct pressure reaches 1.5 times the standard designed duct operating pressure.
      c. Survey all joints for audible leaks. Mark each leak and repair after shutting down blower. Do not apply a retest until sealants have set.
   3. After all audible leaks have been sealed, the remaining leakage should be measured with the orifice section of the test apparatus as follows:
      a. Start blower and open damper until pressure in duct reaches 50% in excess of designed duct operating pressure.
      b. Read the pressure differential across the orifice on manometer No. 2. If there is no leakage, the pressure differential will be zero.

c. Total allowable leakage shall not exceed one (1) percent of the total system design air flow rate. When partial sections of the duct system are tested, the summation of the leakage for all sections shall not exceed the total allowable leakage.
d. Even though a system may pass the measured leakage test, a concentration of leakage at one point may result in a noisy leak which, must be corrected.

4. Testing Report
   a. Contractor shall provide a testing report for each air system to the engineer. The report shall indicate the completion of testing and compliance with testing specification.
   b. All duct testing reports shall be included in the final close out documents.

3.6 DUCT SYSTEM PROTECTION

A. Provide temporary closures at the ends of ducts which are not connected to equipment or air distribution devices at time of ductwork installation; provide temporary closure of polyethylene film or other covering which will prevent entrance of dust and debris until time connections are to be completed.

B. Provide temporary construction filters on air handling equipment and/or return air ductwork during construction to protect ductwork and equipment from dust.

C. Any ductwork stored on site with observable dirt or debris inside shall be cleaned by a third party.

D. If the air handling system has been operated without temporary construction filters or if the integrity of the temporary closures has been compromised, the contractor shall have the duct system cleaned per the following section.

3.7 DUCT SYSTEM CLEANING

A. For renovation projects and HVAC retrofit applications wherein existing duct systems are scheduled to be re-used, or where required by the Duct System Protection section above, the contractor shall have the existing duct systems cleaned in accordance with the current published standards of ASHRAE, NADCA ACR and as indicated below.

B. Duct system cleaning method used shall incorporate the use of vacuum collection devices that are operated continuously during cleaning. A vacuum device shall be connected to the downstream end of the section being cleaned through a predetermined opening. The vacuum collection device must be of sufficient power to render all areas being cleaned under negative pressure, such that containment of debris and the protection of the indoor environment is assured.

C. All vacuum devices exhausting air inside the building shall be equipped with HEPA filters (minimum efficiency), including hand-held vacuums and wet-vacuums.

D. All vacuum devices exhausting air outside the facility shall be equipped with Particulate Collection including adequate filtration to contain debris removed from the HVAC system. Such devices shall exhaust in a manner that will not allow contaminants to re-enter the facility. Release of debris outdoors must not violate any outdoor environmental standards, codes or regulations.

E. Fibrous glass thermal or acoustical insulation elements present in any equipment or ductwork shall be thoroughly cleaned with HEPA vacuuming equipment, while the HVAC system is under constant negative pressure, and not permitted to get wet in accordance with applicable NADCA and NAIMA standards and recommendations.

F. Duct cleaning method used shall not damage the integrity of the ductwork, nor damage porous surface materials such as liners inside the ductwork or system components.

G. Replace the fiberglass material if there is any evidence of damage, deterioration, delamination, friable material, mold or fungus growth, or moisture such that fibrous glass materials cannot be restored by cleaning or resurfacing with an acceptable insulation repair coating.

H. Clean external surfaces of foreign substances which might cause corrosive deterioration of metal or, where ductwork is to be painted, might interfere with painting or cause paint deterioration.

I. Strip protective paper from stainless ductwork surfaces, and repair finish wherever it has been damaged.

J. Cleaning Report: Contractor shall provide a report to the Owner indicating the completion of duct cleaning per specification and areas of the duct system found to be damaged and/or in need of repair.

3.8 DUCT JOINTS AND SEAMS

A. All ductwork shall be constructed to Seal Class A, as referenced in SMACNA (DCS).

B. All non-welded joints and seams shall be sealed. This includes but is not limited to:
   1. Transverse joints.
   2. Longitudinal seams.
   3. Duct wall penetrations.
   4. Spin-ins, taps, and other branch connections.
   5. Access doors, access panels, and duct connections to equipment.

C. Openings for rotating shafts shall be sealed with bushings.

END OF SECTION 23 31 13

SECTION 23 33 00 - DUCTWORK ACCESSORIES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Volume control dampers.

B. Shutoff Dampers.

C. Round Duct Taps.

D. Fire dampers.

E. Back draft dampers.

F. Air turning devices.

G. Flexible duct connections.

H. Duct access doors.

I. Duct test holes.

1.2 RELATED WORK

A. Section 23 02 00 - Basic Materials and Methods for HVAC

B. Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment

C. Section 23 31 13 - Metal Ductwork

1.3 REFERENCES

A. AMCA 500-D - Laboratory Methods of Testing Dampers for Rating; 2018.

B. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. ICC (IECC) - International Energy Conservation Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

E. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2020.

F. UL 33 - Safety Heat Responsive Links for Fire-Protection Service; Current Edition, Including All Revisions.

G. UL 555 - Standard for Fire Dampers; Current Edition, Including All Revisions.

1.4 SUBMITTALS

A. Submit shop drawings and product data under provisions of Division One.

B. Provide shop drawings for shop fabricated assemblies indicated, including volume control dampers duct access doors duct test holes. Provide product data for hardware used.

C. Submit manufacturer's installation instructions under provisions of Division 1, for fire dampers and combination fire and smoke dampers.

PART 2 - PRODUCTS

2.1 VOLUME CONTROL DAMPERS

A. Fabricate in accordance with SMACNA (DCS), and as indicated.

B. Fabricate splitter dampers of material same gauge as duct to 24 inches size in either direction, and two gauges heavier for sizes over 24 inches.

C. Fabricate splitter dampers of double thickness sheet metal to streamline shape. Secure blade with continuous hinge or rod. Operate with minimum 1/2 inch diameter rod in self aligning, universal joint, action flanged bushing, with set screw.

D. Fabricate single blade dampers for duct sizes to 9-1/2 x 24 inch.

E. Fabricate multi-blade damper of opposed blade pattern with maximum blade sizes 12 x 72 inch.
   1. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
   2. On outside air, return air, and all other dampers required to be low leakage type, provide galvanized blades and frames, seven inches wide maximum, with replaceable vinyl, EPDM, silicone rubber seals on blade edges and stainless steel side seals. Provide blades in a double sheet corrugated type construction for extra strength. Provide hat channel shape frames for strength and blade linkage enclosure to keep linkage out of the air stream. Construction leakage not to exceed 1/2%, based on 2,000 fpm and 4 inch static pressure.

F. Except in round ductwork 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.

G. Provide locking, indicating quadrant regulators on single and multi-blade dampers. Where rod lengths exceed 30 inches provide regulator at both ends.

H. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.

2.2 SHUTOFF DAMPERS

A. Fabricate in accordance with SMACNA (DCS), and as indicated.

B. Provide Class I multi-blade damper of parallel blade pattern for all ductwork systems which penetrate the building thermal envelope in accordance with ICC (IECC) and ASHRAE Std 90.1 I-P.

1. Damper shall be constructed of one-piece 16 ga. roll-formed galvanized steel hat-shaped channel frame. Blades shall be 14 ga. roll-formed galvanized steel, airfoil type. Blade edge seals shall be neoprene gaskets mechanically locked to blade edge. Bearings shall be 304 stainless steel, oil-impregnated and self-lubricating sleeve type, turning in extruded holes in damper frame.

C. Shutoff dampers shall have an air leakage rate not greater than 4 cfm/ft^2 of damper surface area at 1.0 in.w.g. and shall be labeled by an approved agency when tested in accordance with AMCA 500-D for such purpose.

2.3 ROUND DUCT TAPS

A. Taps to trunk duct for round flexible duct shall be spin-in fitting with locking quadrant butterfly damper, model no. FLD-B03 by Flexmaster or approved equal.

2.4 ACCEPTABLE MANUFACTURERS - FIRE DAMPERS AND COMBINATION FIRE AND SMOKE DAMPERS

A. Greenheck.

B. Louvers and Dampers Inc.

C. Ruskin.

D. Nailor Industries.

E. Pottorff.

2.5 FIRE DAMPERS

A. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.

B. Provide curtain type dampers of galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations. Configure with blades out of air stream. Provide factory sleeve for each damper.

C. Fabricate multiple blade fire dampers per UL with 16 gauge minimum galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, 1/8 x 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock.

D. Fusible links, UL 33, shall separate at 165 degrees F. Provide adjustable link straps for combination fire/balancing dampers.

2.6 ACCEPTABLE MANUFACTURERS - BACKDRAFT DAMPERS

A. Greenheck.

B. American Warming and Vent.

C. Louvers and Dampers Inc.

D. Ruskin.

E. Pottorff.

F. Substitutions: Under provisions of Division One.

2.7 BACKDRAFT DAMPERS

A. Gravity back draft dampers, size 18 x 18 inches or smaller, furnished with air moving equipment, may be air moving equipment manufacturers standard construction.

B. Fabricate multi-blade, parallel action gravity balanced back draft dampers of 16 gauge galvanized steel, or extruded aluminum, with blades of maximum 6 inch width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.

C. Gravity backdraft dampers shall have an air leakage not greater than 20 cfm/ft^2 where not less than 24 inches in either dimension and 40 cfm/ft^2 where less than 24 inches in either dimension. The rate of air leakage shall be determined at 1.0 in.w.g. when tested in accordance with AMCA 500-D for such purpose.

2.8 ACCEPTABLE MANUFACTURERS - AIR TURNING DEVICES

A. Young Regulator.

B. Titus.

C. Tuttle and Bailey.

D. Substitutions: Under provisions of Division One.

2.9 AIR TURNING DEVICES

A. On duct sizes less than 12 x 12, multi-blade device with blades aligned in short dimension; steel or aluminum construction; with individually adjustable blades, mounting straps.

B. Multi-blade device with radius blades attached to pivoting frame and bracket, steel or aluminum construction, with worm drive mechanism with 18 inch long removable key operator.

2.10 ACCEPTABLE MANUFACTURERS - FLEXIBLE DUCT CONNECTIONS

A. Metaledge.

B. Ventglass.

C. Substitutions: Under provisions of Division One.

2.11 FLEXIBLE DUCT CONNECTIONS TO AIR MOVING EQUIPMENT

A. Fabricate in accordance with SMACNA (DCS) and as indicated.

B. UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 20 oz. per sq. yd., approximately 6 inches wide, crimped into metal edging strip.

2.12 ACCEPTABLE MANUFACTURERS - DUCT ACCESS DOORS

A. Greenheck.

B. American Warming and Vent.

C. Ruskin.

D. Titus.

E. Substitutions: Under provisions of Division One.

2.13 DUCT ACCESS DOORS

A. Fabricate in accordance with SMACNA (DCS) and as indicated.

B. Review locations prior to fabrication.

C. Fabricate rigid and close-fitting doors of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ductwork, install minimum one inch thick insulation with sheet metal cover. Insulation shall be replaceable without field cutting or patching.

D. Access doors smaller than 12 inches square may be secured with sash locks.

E. Provide two hinges and two sash locks for sizes up to 18 inches square, three hinges and two compression latches with outside and inside handles for sizes up to 24 x 48 inches. Provide an additional hinge for larger sizes.

F. Access doors with sheet metal screw fasteners are not acceptable.

2.14 DUCT TEST HOLES

A. Cut or drill temporary test holes in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

B. Permanent test holes shall be factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories in accordance with manufacturer's instructions.

B. Balancing Dampers
   1. Provide at points on low pressure supply, return, and exhaust systems where branches are taken from larger ducts and as required for air balancing. Use splitter dampers only where indicated.

2. All regulators mounted on externally insulated ductwork shall have 16 gauge elevated platforms at least 1/8 inch higher than the thickness of the insulation. Damper shaft shall have Ventlock No. 607 bearing mounted on ductwork within elevated platform. If duct is inaccessible the operating handle shall be extended and the regulator installed on the face of the wall or ceiling. Where regulators are exposed in finished parts of the building, they shall be flush type, Ventlock No. 666. All regulators shall be manufactured by Ventlock, or approved equal.
3. All dampers in lined ductwork shall have bushing to prevent damper damage to liner.

C. Provide fire dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by authorities having jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.

D. Demonstrate re-setting of fire dampers to authorities having jurisdiction and Owner's representative.

E. Provide gravity backdraft dampers or motorized shutoff dampers in accessible location nearest to exterior wall/roof penetrations and where indicated for all outdoor air intake and exhaust systems to automatically shut when the associated systems or spaces served are not in use.

F. Provide flexible duct connections immediately adjacent to equipment in ducts associated with fans and motorized equipment. Provide at least one inch slack at all flexible duct connections.

G. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, and elsewhere as indicated. Provide minimum 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access, and as indicated.

H. Provide duct access doors for inspection and maintenance of all fire dampers, smoke dampers, and combination fire/smoke dampers. Provide minimum 12 x 12 inch size access opening where duct size permits. All duct sizes that cannot accommodate a minimum 12 x 12 inch access opening shall be provided with a removable duct section to permit inspection and maintenance of the damper and its operating parts. Removable duct sections shall match the pressure class of the associated duct system, maintain 100 percent of the duct free area, and utilize gaskets and clamp type draw latches to allow removal and reinstallation without the use of tools.

I. Provide duct test holes where indicated and required for testing and balancing purposes.

END OF SECTION 23 33 00

SECTION 23 34 00 - HVAC FANS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. Section 23 02 00 - Basic Materials and Methods for HVAC shall be included as a part of this Section as though written in full in this document.

1.2 WORK INCLUDED

A. Centrifugal roof ventilators

B. Ceiling and inline ventilators

1.3 RELATED SECTIONS

A. Section 23 02 00 - Basic Materials and Methods for HVAC

B. Section 23 05 13 - Common Motor Requirements for HVAC Equipment

C. Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment

D. Section 23 05 93 - Testing, Adjusting, And Balancing

E. Section 23 09 63 - Energy Management and Control System (EMCS)

F. Section 23 33 00 - Ductwork Accessories

1.4 REFERENCES

A. AMCA 204 - Balance Quality and Vibration Levels for Fans; 2020.

B. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating; 2025.

C. AMCA 211 - Certified Ratings Program Product Rating Manual for Fan Air Performance; 2022, with Editorial Revision (2023).

D. AMCA 300 - Reverberation Room Methods of Sound Testing of Fans; 2024.

E. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data; 2022.

F. AMCA 311 - Certified Ratings Program Product Rating Manual for Fan Sound Performance; 2016.

G. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. ICC (IECC) - International Energy Conservation Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

J. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

K. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2024.

L. UL 705 - Power Ventilators; Current Edition, Including All Revisions.

1.5 QUALITY ASSURANCE

A. UL Compliance: Fans shall be designed, manufactured, and tested in accordance with UL 705.

B. UL Compliance: Fans and components shall be UL listed and labeled.

C. Nationally Recognized Testing Laboratory Compliance (NRTL): Fans and components shall be NRTL listed and labeled. The term "NRTL" shall be as defined in OSHA Regulation 1910.7.

D. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.

E. Electrical Component Standard: Components and installation shall comply with NFPA 70.

F. Sound Power Level Ratings: Comply with AMCA 301. Test fans in accordance with AMCA 300. Fans shall be licensed to bear the AMCA 300 Seal.

G. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings in accordance with AMCA 210.

H. Motors for fans that are not less than 1/12 hp (0.082 kW) and less than 1 hp (0.746 kW) shall be electronically commutated motors per ICC (IECC) and ASHRAE Std 90.1 I-P.

1.6 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections:

B. Product data for selected models, including specialties, accessories, and the following:
   1. Certified fan performance curves with system operating conditions indicated.
   2. Certified fan sound power ratings.
   3. Motor ratings and electrical characteristics plus motor and fan accessories.
   4. Materials, gages and finishes, include color charts.
   5. Dampers, including housings, linkages, and operators.
   6. Full color paint samples.

C. Shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, required clearances, components, and location and size of field connections.

D. Coordination drawings, in accordance with Division 23, Section "Basic Materials and Methods", for roof penetration requirements and for reflected ceiling plans drawn accurately to scale and coordinating penetrations and units mounted above ceiling. Show the following:

1. Roof framing and support members relative to duct penetrations.
2. Ceiling suspension members.
3. Method of attaching hangers to building structure.
4. Size and location of initial access modules for acoustical tile.
5. Ceiling-mounted items including light fixtures, diffusers, grilles, speakers, sprinkler heads, access panels, and special moldings.

E. Wiring diagrams that detail power, signal, and control wiring. Differentiate between manufacturer installed wiring and field installed wiring.

F. Product certificates, signed by manufacturer, certifying that their products comply with specified requirements.

G. Maintenance data for inclusion in Operating and Maintenance Manual specified in Division 1 and Division 23, Section "Basic Materials and Methods".

H. Provide delegated design submittal for equipment anchorage as required in specification 23 02 00 – Part 1.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Fans shall be stored and handled in accordance with the unit manufacturer’s instructions.

B. Lift and support units with the manufacturer`s designated lifting or supporting points.

C. Disassemble and reassemble units as required for movement into the final location following manufacturer`s written instructions.

D. Deliver fan units as a factory-assembled unit to the extent allowable by shipping limitations, with protective crating and covering.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

1.9 OPERATIONS PERSONNEL TRAINING

A. Provide a training session for the owner’s operations personnel. Training session shall be performed by a qualified person who is knowledgeable in the subject system/equipment. Submit a training agenda two (2) weeks prior to the proposed training session for review and approval. Training session shall include at the minimum:
1. Purpose of equipment.
2. Principle of how the equipment works.
3. Important parts and assemblies.
4. How the equipment achieves its purpose and necessary operating conditions.
5. Most likely failure modes, causes and corrections.
6. On site demonstration.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Greenheck Fan Corporation

B. Loren Cook Company

C. Twin City Fan and Blower

D. CaptiveAire

2.2 GENERAL DESCRIPTION

A. Provide fans that are factory fabricated and assembled, factory tested, and factory finished with indicated capacities and characteristics.

B. Fans and Shafts shall be statically and dynamically balanced and designed for continuous operation at the maximum rated fan speed and motor horsepower.

C. Provide factory baked-enamel finish coat after assembly. Color for roof mounted fans shall be chosen by Architect during the submittal process.

D. Provide all fans with engraved aluminum equipment nameplates indicating fan name tag, design operation airflow, design operating static pressure, manufacturer, model number, and serial number.

2.3 CENTRIFUGAL ROOF VENTILATORS

A. Fan shall be a spun aluminum, centrifugal, roof mounted, direct driven or belt driven as indicated.

B. Fan shall be UL 705 listed. Fan shall bear the AMCA certified ratings seal for sound and air performance.

C. The fan shall be of bolted and welded construction utilizing corrosion resistant fasteners. The spun aluminum structural components shall be constructed of minimum 16 gauge marine alloy aluminum, bolted to a rigid aluminum support structure.

D. The aluminum base shall have continuously welded curb cap corners for maximum leak protection. A discharge baffle conduit chase shall be provided through the curb cap and into the motor compartment to facilitate wiring connections.

E. The motor, bearings and drives shall be mounted on a minimum 14 gauge steel power assembly, isolated from the unit structure with rubber vibration isolators. These components shall be enclosed in a weather-tight compartment, separated from the exhaust airstream. Unit shall bear an engraved aluminum nameplate and shall be shipped in transit tested packaging.

F. Wheel shall be centrifugal backward inclined, constructed of 100% aluminum, including a precision machined cast aluminum hub. Wheel inlet shall overlap an aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Wheel shall be balanced in accordance with AMCA 204, balance quality and vibration levels for fans.

G. Motor shall be heavy duty type with permanently lubricated sealed ball bearings.

H. Bearings shall be designed and individually tested specifically for use in air handling applications. Construction shall be heavy duty re-greaseable ball type in a cast iron housing selected for a minimum L50 life in excess of 200,000 hours at maximum cataloged operating speed.

I. Accessories: The following accessories are required.
   1. Disconnect Switch: Non-fusible type, with thermal overload protection, mounted inside fan housing, factory-wired through an internal aluminum conduit.
   2. Bird Screens: Removable ½ inch mesh, 16 gauge, aluminum or brass wire.
   3. Dampers: Gravity backdraft damper or motorized shutoff damper mounted in accessible location. Refer to 23 33 00 - Ductwork Accessories.
   4. Roof Curbs: Prefabricated, minimum 18 inch high, heavy-gauge, galvanized steel; mitered and welded corners; 2 inch thick, rigid, fiberglass insulation adhered to inside walls; built-in cant and mounting flange for flat roof decks; and 2 inch wood nailer. Curb heights shall be increased as required to maintain a minimum height of 8 inches above adjacent roofing surface. Size as required to suit roof opening and fan base. Roof curb shall match roof slope so that the curb is level.

2.4 CEILING AND INLINE VENTILATORS

A. Ceiling and inline ventilators shall be direct drive or belt drive as indicated, centrifugal blower type. Fan wheel shall be constructed of galvanized steel and shall be dynamically balanced. The housing shall be constructed of minimum 20 gauge corrosion resistant galvanized steel and acoustically insulated for quiet operation. Blower and motor assembly shall be easily removable from the housing without disturbing the ductwork. The motor shall be permanently lubricated with built-in thermal overload protection and shall be factory tested prior to shipment. The ceiling ventilators shall be furnished standard with a powder-painted white steel grille.

B. Ventilators shall be certified and licensed to bear the AMCA Seal for Air and Sound Performance. Ventilator performance shall be based on tests and procedures performed in accordance with AMCA 211 and comply with the requirements of the AMCA Certified Ratings Program. Fan sound power level ratings shall be based on tests and procedures performed in accordance with AMCA 311 and comply with the requirements of the AMCA Certified Ratings Program. Ventilators shall be UL listed and CSA certified.

C. Accessories: The following accessories are required.
   1. Dampers:
      a. Aluminum backdraft damper.
      b. Motor-operated volume control damper.
      c. L listed ceiling radiation damper for ceiling fans comply with NFPA 90A rated for 3 hours
   2. Disconnect Switch: Nonfusible type with thermal overload protection.
   3. Speed Controls: Fan mounted, solid state speed controller.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer’s instructions.

B. Refer to specification 23 02 00 – Part 1 for anchorage requirements for roof mounted equipment.

C. All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items required as per manufacturer's requirements.

D. Refer to 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment for additional installation requirements.

E. Flexible duct connections and shutoff dampers are prohibited from being installed in duct systems conveying grease laden exhaust air per NFPA 96 requirements.

F. All roof mounted fans shall have electrical wiring and conduit internal to roof curb and fan housing. No external wiring or conduit to be allowed on the roof.

END OF SECTION 23 34 00

SECTION 23 37 13 - AIR DISTRIBUTION DEVICES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Ceiling air diffusers.

B. Wall registers and grilles.

C. Louvers.

D. Other air devices indicated on drawings and schedules.

1.2 RELATED SECTIONS

A. Section 23 02 00 - Basic Materials and Methods for HVAC

B. Section 23 05 93 - Testing, Adjusting, And Balancing

C. Section 23 07 13 - Duct Insulation

D. Section 23 31 13 - Metal Ductwork

E. Section 23 33 00 - Ductwork Accessories

1.3 REFERENCES

A. AHRI 880 (I-P) - Performance Rating of Air Terminals; 2017 (Reaffirmed 2023).

B. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2023.

C. AMCA 540 - Test Method for Louvers Impacted by Wind Borne Debris; 2013.

D. AMCA 550 - Test Method for High Velocity Wind Driven Rain Resistant Louvers; 2022.

E. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Air Inlets; 2023.

F. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus; 2019.

G. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

H. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

I. ASTM D2794 - Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact); 1993 (Reapproved 2024).

J. ASTM D870 - Standard Practice for Testing Water Resistance of Coatings Using Water Immersion; 2015.

K. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

L. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

1.4 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of air distribution devices of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Codes and Standards:
1. AHRI Compliance: Test and rate air distribution devices in accordance with AHRI 880 (I-P).
2. ASHRAE Compliance: Test and rate air distribution devices in accordance with ASHRAE Std 70.
3. AMCA Compliance: Test and rate louvers in accordance with AMCA 500-L.
4. AMCA 540 - Test Methods for Louvers Impacted by Wind Borne Debris with Enhanced Protection Approval.
5. AMCA 550 - Test Method for High Velocity Wind Driven Rain Resistant Louvers.
6. AMCA Seal: Provide louvers bearing AMCA Certified Rating Seal.
7. NFPA Compliance: Install air distribution devices in accordance with NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.
8. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
9. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
10. IBC - International Building Code.
11. IMC - International Mechanical Code.
12. UMC - Uniform Mechanical Code.

1.5 DEFINITIONS

A. Hurricane-prone regions:
1. The U.S. Atlantic Ocean and Gulf of Mexico coasts where the ultimate design wind speed for Risk Category II Buildings is greater than 115 mph;
2. Hawaii, Puerto Rico, Guam, Virgin Islands and American Samoa.

B. Wind-borne debris region: Areas within hurricane-prone regions located:
1. Within 1 mile of the coastal mean high water line where the ultimate design wind speed is 130 mph or greater; or
2. In areas where the ultimate design wind speed is 140 mph or greater. For Risk Category II buildings and structures and Risk Category III building and structures, except health care facilities, the wind-borne debris region shall be based on Figure 1609.3(1). For Risk Category IV buildings and structures and Risk Category III health care facilities, the wind-borne debris region shall be based on Figure 1609.3(2).

C. Ultimate design wind speed - The ultimate design wind speed for the determination of the wind loads shall be determined by Figures 1609.3(1), 1609.3(2) and 1609.3(3) of ICC (IBC).

1.6 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data for the following:
1. Air Distribution Devices

a. Schedule of air distribution devices indicating drawing designation, room location, number furnished, model number, size, and accessories furnished.
b. Data sheet for each type of air distribution devices, and accessory furnished; indicating construction, finish, and mounting details.
c. Performance data for each type of air distribution devices furnished, including aspiration ability, temperature and velocity traverses; throw and drop; and noise criteria ratings. Indicate selections on data.

2. Louvers
a. Manufacturer's product data including performance data.
b. Preparation instructions and recommendations.
c. Storage and handling requirements and recommendations.
d. Installation methods.

B. Shop Drawings: Submit manufacturer's assembly-type shop drawing for each type of air distribution device and louver, indicating materials, construction, dimensions, accessories, and installation details.

C. Maintenance Data: Submit maintenance data, including cleaning instructions for finishes, and spare parts lists. Include this data, product data, and shop drawings in maintenance manuals; in accordance with requirements of Division 1.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver air distribution devices wrapped in factory-fabricated fiber-board type containers. Identify on outside of container type of outlet or inlet and location to be installed. Avoid crushing or bending and prevent dirt and debris from entering and settling in devices.

B. Store air distribution devices and louvers in original cartons and protect from weather and construction work traffic in accordance with manufacturer’s instructions. Where possible, store indoors; when necessary to store outdoors, store above grade and enclose with waterproof wrapping.

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.8 WARRANTY

A. Warrant the installation of the work specified herein for one year against becoming unserviceable or causing an objectionable appearance resulting from defective or nonconforming workmanship.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - AIR DEVICES

A. Titus Company

B. Metalaire Industries, Inc.

C. Nailor Industries

D. Krueger

E. Price

2.2 AIR DEVICES

A. Unless otherwise indicated, provide manufacturer's standard air devices when shown of size, shape, capacity, type and accessories indicated on drawings and schedules, constructed of materials and components as indicated and as required for complete installation and proper air distribution.

B. Provide air devices that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device and listed in manufacturer's current data.

C. Unless noted otherwise on drawings, the finish shall be #26 white. The finish shall be an anodic acrylic paint, baked at 315°F for 30 minutes. The pencil hardness must be HB to H. The paint must pass a 100-hour ASTM B117 Corrosive Environments Salt Spray Test without creepage, blistering, or deterioration of film. The paint must pass a 250-hour ASTM D870 Immersion Test. The paint must also pass the ASTM D2794 Reverse Impact Cracking Test with a 50 inch-pound force applied.

D. Provide air device with border styles that are compatible with adjacent ceiling or wall system, and that are specially manufactured to fit into the wall construction or ceiling module with accurate fit and adequate support. Refer to architectural construction drawings and specifications for types of wall construction and ceiling systems.

E. Provide integral volume damper with roll formed steel blades where indicated on drawings or schedules. Dampers shall be opposed blade design with a screwdriver slot or a concealed lever operator for adjustment through the face of the air device.

F. Air devices designated for fire rated systems shall be pre-assembled with UL classified radiation damper and thermal blanket. Fire rated air devices shall be shipped completely assembled, one assembly per carton; each assembly shall be enclosed in plastic shrink wrap with installation instructions.

2.3 ACCEPTABLE MANUFACTURERS - LOUVERS

A. Ruskin Manufacturing Company

B. Greenheck Company

C. Louvers and Dampers, Inc.

D. Pottorff

E. Arrow

2.4 LOUVERS

A. Louvers not located in hurricane-prone regions or wind-borne debris regions shall meet the requirements of AMCA 500-L for Laboratory Methods of Testing Louvers for Rating and be drainable stationary type louvers.

B. Louvers located in hurricane-prone regions shall meet the requirements of AMCA 550 for High Velocity Wind Driven Rain without the use of a control damper.

C. Louvers located in wind-borne debris regions within 30 feet of grade shall meet the requirements of AMCA 540 for Large Missile Impact.

D. Provide louvers where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.

E. Provide louvers that have minimum free area and maximum pressure drop as indicated on drawings.

F. Provide louvers with frame and sill styles that are compatible with adjacent substrate, and that are specifically manufactured to fit into construction openings with accurate fit and adequate support, for weatherproof installation. Refer to architectural construction drawings and specifications for types of substrate.

G. Coordinate with Architect for finish and color.

H. Louver Screens: On inside face of exterior louvers, provide 1/2" square mesh anodized aluminum wire bird screens mounted in removable extruded aluminum frames.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All interior surfaces of all air devices shall be painted flat black.

B. See floor plans for type, neck size and CFM of air for all air distribution devices.

C. Install all air distribution devices as detailed on plans and in accordance with manufacturer’s recommendations.

D. The backside of all air devices shall be insulated with taped and sealed external duct wrap to match the insulation thickness and R-value of the ductwork connecting to the air device. Refer to 23 07 13 - Duct Insulation.

E. Inspect areas to receive louvers. Notify the Architect of conditions that would adversely affect the installation or subsequent utilization of the louvers. Do not proceed with installation until unsatisfactory conditions are corrected.

F. If opening preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

G. Install louvers at locations indicated on the drawings and in accordance with manufacturer's instructions.

H. Install louvers plumb, level, in plane of wall, and in alignment with adjacent work.

I. Touch-up, repair or replace any damaged products prior to substantial completion.

END OF SECTION 23 37 13

SECTION 23 41 00 - AIR FILTERS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. Section 23 02 00 - Basic Materials and Methods for HVAC are included as a part of this Section as though written in full in this document.

1.2 SCOPE

A. Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for owner's use.

1.3 REFERENCES

A. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 2025.

B. ASHRAE Std 62.1 - Ventilation for Acceptable Indoor Air Quality; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

PART 2 - PRODUCTS

2.1 FILTERS

A. Air filters shall be high efficiency ASHRAE pleated panels consisting of synthetic media, welded wire media support grid, and beverage board enclosing frame, AAF PREpleat M13, 2-inch thick or approved equal.

B. APPROVED MANUFACTURERS
   1. American Air Filter.
   2. Camfil.
   3. Airguard Industries, Inc.
   4. Cambridge.
   5. Filtration Group

2.2 LOW VELOCITY FILTER SECTION

A. Filters shall be of the throwaway cartridge type in 2-inch frames. When installing multiple filters into slide-in frames tape adjacent filters together with duct tape to prevent bypassing of air around the filter. Media shall be rated at 500 feet per minute.

B. Filtering media shall be formed of non-woven reinforced synthetic type filtering media bonded to 96% open area media support grid folded into a non-creased radial pleat design. The filter pack shall be bonded to the enclosing frame to prevent air bypass. Minimum Efficiency Reporting Value of MERV 13 when evaluated under the guidelines of ASHRAE Std 52.2. Initial resistance shall not exceed 0.30 inches water gauge at 500 fpm face velocity.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Filters shall be provided upstream of all cooling coils or other devices with wetted surfaces through which air is supplied to occupiable spaces per ASHRAE Std 62.1.

B. Install differential pressure switch to activate "Filter Dirty" light when pressure difference across filters reaches 0.5 inches w.g. (adjustable). Locate "filter dirty" lights in mechanical rooms with identifying label.

C. Refer to Section 23 02 00 for additional filter information.

END OF SECTION 23 41 00

SECTION 23 74 19 - ROOFTOP HEATING AND COOLING UNITS (ELECTRIC COOLING - ELECTRIC HEAT)

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. Section 23 02 00 - Basic Materials and Methods for HVAC shall be included as a part of this Section as though written in full in this document.

1.2 SCOPE

A. Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for owner's use.

1.3 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Section 23 09 63 - Energy Management and Control System (EMCS)

1.4 RELATED SECTIONS

A. Section 23 02 00 - Basic Materials and Methods for HVAC

B. Section 23 05 13 - Common Motor Requirements for HVAC Equipment

C. Section 23 05 26 - Variable Frequency Motor Speed Control for HVAC Equipment

D. Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment

E. Section 23 05 93 - Testing, Adjusting, And Balancing

F. Section 23 33 00 - Ductwork Accessories

G. Section 23 41 00 - Air Filters

1.5 REFERENCES

A. AHRI 210/240 - Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2023.

B. AHRI 270 (SI/I-P) - Sound Performance Rating of Outdoor Unitary Equipment; 2025.

C. AHRI 340/360 - Performance Rating of Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment; 2019.

D. AHRI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils; 2001, with Addenda (2011).

E. AMCA 300 - Reverberation Room Methods of Sound Testing of Fans; 2024.

F. AMCA 500-D - Laboratory Methods of Testing Dampers for Rating; 2018.

G. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2024, with Errata (2025).

H. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. ICC (IECC) - International Energy Conservation Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

K. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2024.

1.6 QUALITY ASSURANCE

A. Unit shall be factory-charged and tested, shall be UL-labeled and certified by AHRI 210/240 or AHRI 340/360.

B. Unit shall comply with ASHRAE Std 15.

C. Unit shall meet or exceed minimum efficiency requirements in accordance with ICC (IECC) and ASHRAE Std 90.1 I-P.

D. Unit shall be rated for sound performance in accordance with AHRI 270 (SI/I-P) and AMCA 300.

E. Coil performance shall be certified in accordance with AHRI 410.

F. Insulation and insulation adhesive shall comply with NFPA 90A requirements or flame spread and smoke generation.

1.7 SUBMITTALS

A. Submit Shop drawings and product data under provisions of Division One.

B. Shop drawings shall indicate components, dimensions, weights, required service clearances, and location and sizes of field connections. Indicate equipment, piping and connections and valves required for complete system.

C. Product data shall include rated capacities, weights, specialties and accessories, electrical requirements and wiring diagrams.

D. Provide fan curves with specified operating point clearly identified.

E. Submit manufacturer's installation instructions.

F. Provide delegated design submittal for equipment anchorage as required in specification 23 02 00 – Part 1.

1.8 OPERATION AND MAINTENANCE DATA

A. Submit operation data.

B. Include start-up instructions, maintenance data, controls, and accessories. Include trouble-shooting guide.

C. Submit maintenance data.

1.9 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, protect and handle products to site. Comply with manufacturer's installation instructions for rigging, unloading and transporting units.

B. Accept products on site and inspect for damage.

C. Protect units from physical damage. Factory shipping covers and skids shall be kept in place until installation. Store in a clean dry place and protect from weather and construction traffic.

1.10 WARRANTY

A. Provide labor warranty by the installing Contractor on all equipment and components for one (1) year from date of substantial completion.

B. Provide complete warranty by the equipment manufacturer on all equipment and components for ten (10) years from date of substantial completion.

1.11 OPERATIONS PERSONNEL TRAINING

A. Provide a training session for the owner’s operations personnel. Training session shall be performed by a qualified person who is knowledgeable in the subject system/equipment. Submit a training agenda two (2) weeks prior to the proposed training session for review and approval. Training session shall include at the minimum:
   1. Purpose of equipment.
   2. Principle of how the equipment works.
   3. Important parts and assemblies.
   4. How the equipment achieves its purpose and necessary operating conditions.
   5. Most likely failure modes, causes and corrections.
   6. On site demonstration.

1.12 CLOSEOUT DOCUMENTATION

A. Prepare and turn over to the Owner's designated representative closeout documentation to include the following at a minimum:
   1. Cover sheet with date, school name and address. Include name of General Contractor, installing Mechanical Contractor, and chiller manufacturer on the cover page.
   2. As-built packaged unit submittals.
   3. Completed startup report for all packaged units.
   4. Manufacturer's unit-specific warranty documentation, detailing the start and end dates for each specific unit warranty.
   5. Coordinate with the Owner's Maintenance and Operations department for their preference of written reports (in binder format) and/or digital reports (on USB flash drive or other preferred method), and number of copies of each.

6. Closeout documentation to be presented at time of Owner's personnel training or other Owner's Maintenance and Operations preferred time.

PART 2 - PRODUCTS

2.1 ROOFTOP UNIT

A. Rooftop unit shall be packaged and include electric cooling and electric heat with capacity and modulating cooling and heating as shown on the drawings.

B. Unit shall be factory-charged and tested, shall be UL-labeled, AHRI 210/240 and AHRI 270 (SI/I-P) certified, and shall be AGA-certified.

C. Unit casing shall be heavy-gauge galvanized steel or heavy-gauge aluminum with protective coat of baked enamel. Weatherproof access panels shall be provided for access to all parts requiring service. Access panels shall be hinged and include handles.

D. Compressor(s) shall be hermetic scroll type and shall be resiliently mounted to avoid vibration and noise. Compressor shall be provided with anti-slugging protection, crankcase heater, and time delay on recycling of the compressor. Two internal compressor motor thermal cutouts and a hot gas cutout shall protect the compressor in addition to high-pressure and low-pressure safeties. Standard controls shall permit operation down to 35 deg. F (2 deg. C) and compressor shall be locked out below this temperature.
   1. All units 6 tons and smaller shall have a minimum of two stages of cooling.
   2. All units 7.5 tons and larger shall have a minimum of two independent refrigerant circuits.

E. Condenser fan(s) shall be direct-driven on the shaft of the slow-speed motor, which shall be designed to operate exposed to the weather.

F. Condenser coils shall have a sub-cooling section. Condenser coils shall be aluminum-plate fins bonded to seamless copper tubes or all aluminum microchannel design.

G. Refrigerant circuit shall include filter dryer, moisture indicator, sight glass, gauge ports, and brass service valves installed in discharge and liquid lines. The refrigerant circuit shall utilize R410a refrigerant.

H. Filter rack shall be provided for filters 2 in. thick, MERV 13 rated, and shall filter both outdoor air and return air. See Section 23 41 00 - Air Filters for type of filters and the number of filter changes to be furnished with the equipment.

I. Evaporator fan shall be quiet-type, forward cuved, centrifugal blower, directly connected to an adjustable-speed motor. All units 6 tons and smaller shall have a minimum two (2) speed fan.

J. Electric heat section shall be installed in the unit and served by the same power source as the rest of the unit. Only one power feed shall be required for the unit.

2.2 ELECTRICAL

A. Unit wiring shall comply with NFPA 70 requirements and with all applicable UL standards. All electrical components shall be UL recognized where applicable. All wiring and electrical components provided with the unit shall be number and color-coded and labeled according to the electrical diagram provided for easy identification. The unit shall be provided with a factory wired weatherproof control panel. Unit shall have a single point power terminal block for main power connection. Unit shall have a minimum short circuit current rating (SCCR) of 10,000 AIC. A terminal board shall be provided for low voltage control wiring. Branch short circuit protection, 115-volt control circuit transformer and fuse, system switches, and a high temperature sensor shall also be provided with the unit. Each compressor and condenser fan motor shall be furnished with contactors and inherent thermal overload protection. Supply fan motors shall have contactors and external overload protection. Knockouts shall be provided in the bottom of the main control panels for field wiring entrance.

2.3 ACCESSORY EQUIPMENT

A. Unit shall be provided with hot gas reheat option for dehumidification. Hot gas reheat coil shall be located on the leaving air side of the evaporator coil and fully piped and circuited at the factory.

B. Steel louvered condenser coil hail guards shall be provided.

C. A prefabricated heavy gauge galvanized steel, mounting curb shall be provided for field assembly on the roof decking prior to unit shipment. The roof curb shall be a full perimeter type with complete perimeter support of the air handling section and condensing section. The curb height shall be coordinated for the installation location so that the top of the curb is a minimum of 14" clear above the adjacent roof finish elevation. The curb shall include a nominal 2" x 4" wood nailing strip. Curb height shall be increased as required to maintain a minimum height of 8 inches above adjacent roofing surface. Gasket shall be provided for field mounting between the unit base and roof curb.

D. Provide "power saver" dampers and controls to provide "free cooling" from 0 to 100% outdoor air (OA) when the outside air humidity and temperature are acceptable. Provide OA, return air, and relief air dampers in a factory-provided enclosure. All air shall be filtered and bird screen shall be installed. Dampers shall have an air leakage rate not greater than 4 cfm/ft^2 of damper surface area at 1.0 in.w.g. and shall be labeled by an approved agency when tested in accordance with AMCA 500-D for such purpose.

E. A solid-state enthalpy changeover control shall determine the capability of the outside air to provide free cooling. The economizer package shall include a differential enthalpy sensor in the return air duct to compare the enthalpy of the outside air and return air and use the air with the lowest enthalpy for free cooling or assisting the mechanical cooling. The cooling control sequence is as follows:
   1. Through the sensors included in the economizer package, the 3rd party EMCS vendor's controls shall determine if the outdoor air is suitable for free cooling.
   2. The space thermostat determines if cooling is needed in the building. If so:
   3. The actuator modulates the outdoor air and return air dampers to maintain the desired mixed air temperature.
   4. The second cooling stage of the space thermostat energizes the compressor to assist the economizer if required.

5. If the outdoor air is not suitable for free cooling, the outdoor air damper remains in the minimum ventilation position and the compressor is energized when space cooling is required.

F. Provide a warm-up thermostat to prevent the OA dampers from opening if the return air temperature is below the set point (65 deg. F) (18 deg. C).

G. Provide necessary low ambient controls for operation of the compressor below the normal temperature of the compressor cutout. Operation shall be permitted down to temperature specified on drawings.

H. Provide factory-trained service person to check out the system, calibrate the controls, and see that the RTU is operating properly. The service person making the settings shall make a written report to the engineer and the owner with all set points listed for future reference.

I. Rooftop units mounted on slabs or other fixed locations shall be provided with adapters for end discharge and return to the unit.

J. Provide unit with powered 15 amp GFCI convenience outlet with independent fuse protection. Outlet shall be factory installed with 115v receptacle that can be accessible from outside the unit. Provide outlet with weatherproof cover. Unit electrical ratings shall be UL certified and rated for additional outlet amperage.

2.4 CONTROLS

A. Units shall include all required temperature sensors, pressure sensors, actuators, etc. All sensors and actuators shall be factory mounted, wired, and tested.

B. Units shall be provided with a terminal strip that allows the 3rd party EMCS vendor to control all unit functions. All field wiring shall be terminated at the terminal strip. The terminal strip shall be clearly marked.

C. The 3rd party EMCS shall permit starting and stopping of the unit. The control system shall be capable of providing a remote alarm indication. At a minimum, the control system shall provide for outside air damper actuation, return air damper actuation, economizer operation, emergency shutdown, heating staging, cooling staging, heating indication, cooling indication, and fan operation.

D. Each unit shall have a time schedule provided through the 3rd party EMCS controller.

E. Units shall be programmed with a night setback and setup function.

2.5 ACCEPTABLE MANUFACTURERS

A. Trane

B. Aaon

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install the curb as required by the job conditions and as recommended by the manufacturer, and install proper flashing and counterflashing. See details on the drawings.

B. Refer to specification 23 02 00 – Part 1 for anchorage requirements for roof mounted equipment.

C. Set the unit in place, taking care to protect the adjacent roofing, and connect the supply and return ductwork.

D. Make electrical connections, taking care that these do not block access to any part of the equipment requiring service.

E. Unit wiring shall comply with NFPA 70 and all applicable UL standards.

F. Have the factory service person check out the unit and make a written report. Place the unit in service. Manufacturer shall furnish a start-up completion record, signed by the manufacturer's representative and the successful contractor and shall include:
   1. Dates of start-up and personnel in attendance.
   2. Dates of owner instruction and personnel in attendance.
   3. Design performance data.
   4. Actual performance data.
   5. Verification of system airflow.
   6. Proper operation of all motors and fans.
   7. Proper tensioning of belts and pulleys (if applicable).
   8. Proper control of economizer damper.
   9. Proper compressor operation.
   10. Proper operation of cooling and heating modes.

G. Connect full size condensate drain pipe to roof top unit and extend to nearest drain, pipe shall be schedule 40 galvanized with malleable iron fittings.

H. Unit installation shall comply with NFPA 90A requirements.

3.2 BALANCING AND TEST

A. Operate the roof top unit and check for proper supply air quantity, noise, and proper operation.

B. Report the airflow, static pressure, voltage and current draw of each item, refrigerant pressure readings, etc., as required by Section 23 05 93 - Testing, Adjusting, And Balancing. This system is not complete until these readings have been made, submitted to the engineer, and accepted.

END OF SECTION 23 74 19

SECTION 26 02 00 - BASIC MATERIALS AND METHODS FOR ELECTRICAL

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all Work herein.

B. The Contract Drawings indicate the extent and general arrangement of the systems. If any departure from the Contract Drawings are deemed necessary by the Contractor, details of such departures and the reasons therefore, shall be submitted to the Architect for approval as soon as practicable. No such departures shall be made without the prior written approval of the Architect.

1.2 SCOPE OF WORK

A. The Work included under this Contract consists of the furnishing and installation of all equipment and material necessary and required to form the complete and functioning systems in all of its various phases, all as shown on the accompanying Drawings and/or described in these Specifications. The contractor shall review all pertinent drawings, including those of other contracts prior to commencement of Work.

B. This Division requires the furnishing and installing of all items Specified herein, indicated on the Drawings or reasonably inferred as necessary for safe and proper operation; including every article, device or accessory (whether or not specifically called for by item) reasonably necessary to facilitate each system's functioning as indicated by the design and the equipment specified. Elements of the work include, but are not limited to, materials, labor, supervision, transportation, storage, equipment, utilities, all required permits, licenses and inspections. All work performed under this Section shall be in accordance with the Project Manual, Drawings and Specifications and is subject to the terms and conditions of the Contract.

C. The approximate locations of Electrical items are indicated on the Drawings. These Drawings are not intended to give complete and accurate details in regard to location of outlets, apparatus, etc. Exact locations are to be determined by actual measurements at the building, and will in all cases be subject to the Review of the Owner or Engineer, who reserves the right to make any reasonable changes in the locations indicated without additional cost to the Owner.

D. Items specifically mentioned in the Specifications but not shown on the Drawings and/or items shown on Drawings but not specifically mentioned in the Specifications shall be installed by the Contractor under the appropriate section of work as if they were both specified and shown.

E. All discrepancies within the Contract Documents discrepancies between the Contract Documents and actual job-site conditions shall be reported to the Owner or Engineer so that they will be resolved prior to the bidding, where this cannot be done at least 7 working days prior to bid; the greater or more costly of the discrepancy shall be bid. All labor and materials required to perform the work described shall be included as part of this Contract.

F. It is the intention of this Section of the Specifications to outline minimum requirements to furnish the Owner with a turn-key and fully operating system in cooperation with other trades.

G. It is the intent of the above "Scope" to give the Contractor a general outline of the extent of the Work involved; however, it is not intended to include each and every item required for the Work. Anything omitted from the "Scope" but shown on the Drawings, or specified later, or necessary for a complete and functioning heating, ventilating and air conditioning system shall be considered a part of the overall "Scope".

H. The Contractor shall rough-in fixtures and equipment furnished by others from rough-in and placement drawings furnished by others. The Contractor shall make final connection to fixtures and equipment furnished by others.

I. Contractor shall participate in the commissioning process; including but not limited to meeting attendance, completion of checklists and participation in functional testing.

1.3 RELATED SECTIONS

A. General Conditions

B. Supplementary Conditions

C. Division One

1.4 COOPERATION WITH TRADES:

A. Cooperation with trades of adjacent, related, or affected materials or operations shall be considered a part of this work in order to affect timely and accurate placing of work and bring together in proper and correct sequence, the work of such trades.

1.5 REFERENCES

A. National Electrical Code (NEC)

B. American Society for Testing and Materials (ASTM)

C. Underwriter's Laboratories, Inc. (UL)

D. Insulated Cable Engineer's Association (ICEA).

E. National Electrical Manufacturer's Association (NEMA).

F. Institute of Electrical and Electronic's Engineers (IEEE).

G. American National Standards Institute (ANSI).

H. National Fire Protection Association (NFPA).

I. International Energy Conservation Code (IECC).

1.6 COMPLETE FUNCTIONING OF WORK:

A. All work fairly implied as essential to the complete functioning of the electrical systems shown on the Drawings and Specifications shall be completed as part of the work of this Division unless specifically stated otherwise. It is the intention of the Drawings and Specifications to establish the types of the systems, but not set forth each item essential to the functioning of the system. In case of doubt as to the work intended, or in the event of amplification or clarification thereof, the Contractor shall call upon the Architect for supplementary instructions, Drawings, etc.

B. Contractor shall review all pertinent Drawings and adjust his work to all conditions shown there on. Discrepancies between Plans, Specifications, and actual field conditions shall be brought to the prompt attention of the Architect.
   1. Approximate location of transformers, feeders, branch circuits, outlets, lighting and power panels, outlets for special systems, etc., are indicated on the Drawings. However, the Drawings, do not give complete and accurate detailed locations of such outlets, conduit runs, etc., and exact locations must be determined by actual field measurement. Such locations will, at all times, be subject to the approval of the Architect.
   2. Communicate with the Architect and secure his approval of any outlet (light fixture, receptacle, switch, etc.) location about which there may be the least question. Outlets obviously placed in a location not suitable to the finished room or without specific approval, shall be removed and relocated when so directed by the Architect. Location of light fixtures shall be coordinated with reflected ceiling plans.

C. Additional coordination with mechanical contractor may be required to allow adequate clearances of mechanical equipment, fixtures and associated appurtenances. Contractor to notify Architect and Engineer of unresolved clearances, conflicts or equipment locations.

1.7 SCHEMATIC NATURE OF CONTRACT DOCUMENTS

A. The contract documents are schematic in nature in that they are only to establish scope and a minimum level of quality. They are not to be used as actual working construction drawings. The actual working construction drawings shall be the approved shop drawings.

1.8 CONTRACTOR'S QUALIFICATIONS

A. An approved contractor for the work under this division shall be:
   1. A specialist in this field and have the personnel, experience, training, and skill, and the organization to provide a practical working system.
   2. Able to furnish evidence of having contracted for and installed not less than 3 systems of comparable size and type that have served their Owners satisfactorily for not less than 3 years.
   3. Perform work by persons qualified to produce workmanship of specified quality. Persons performing electrical work shall be required to be licensed. Onsite supervision, journeyman shall have minimum of journeyman license. Helpers, apprentices shall have minimum of apprentice license.

1.9 DATE OF FINAL ACCEPTANCE

A. The date of final acceptance shall be the date of owner occupancy, or the date all punch list items have been completed or final payment has been received. Refer to Division One for additional requirements.

B. The date of final acceptance shall be documented in writing and signed by the architect, owner and contractor.

1.10 DEFINITIONS AND SYMBOLS

A. General Explanation: A substantial amount of construction and Specification language constitutes definitions for terms found in other Contract Documents, including Drawings which must be recognized as diagrammatic and schematic in nature and not completely descriptive of requirements indicated thereon. Certain terms used in Contract Documents are defined generally in this article, unless defined otherwise in Division 1.

B. Definitions and explanations of this Section are not necessarily either complete or exclusive, but are general for work to the extent not stated more explicitly in another provision of the Contract Documents.

C. Indicated: The term "Indicated" is a cross-reference to details, notes or schedules on the Drawings, to other paragraphs or schedules in the Specifications and to similar means of recording requirements in Contract Documents. Where such terms as "Shown", "Noted", "Scheduled", "Specified" and "Detailed" are used in lieu of "Indicated", it is for the purpose of helping the reader locate cross-reference material, and no limitation of location is intended except as specifically shown.

D. Directed: Where not otherwise explained, terms such as "Directed", "Requested", "Accepted", and "Permitted" mean by the Architect or Engineer. However, no such implied meaning will be interpreted to extend the Architect's or Engineer's responsibility into the Contractor's area of construction supervision.

E. Reviewed: Where used in conjunction with the Engineer's response to submittals, requests for information, applications, inquiries, reports and claims by the Contractor the meaning of the term "Reviewed" will be held to limitations of Architect's and Engineer's responsibilities and duties as specified in the General and Supplemental Conditions. In no case will "Reviewed" by Engineer be interpreted as a release of the Contractor from responsibility to fulfill the terms and requirements of the Contract Documents.

F. Furnish: Except as otherwise defined in greater detail, the term "Furnish" is used to mean supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.

G. Install: Except as otherwise defined in greater detail, the term "Install" is used to describe operations at the project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations, as applicable in each instance.

H. Provide: Except as otherwise defined in greater detail, the term "Provide" is used to mean "Furnish and Install", complete and ready for intended use, as applicable in each instance.

I. Installer: Entity (person or firm) engaged by the Contractor or its subcontractor or Sub-contractor for performance of a particular unit of work at the project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations, as applicable in each instance. It is a general requirement that such entities (Installers) be expert in the operations they are engaged to perform.

J. Imperative Language: Used generally in Specifications. Except as otherwise indicated, requirements expressed imperatively are to be performed by the Contractor. For clarity of reading at certain locations, contrasting subjective language is used to describe responsibilities that must be fulfilled indirectly by the Contractor, or when so noted by other identified installers or entities.

K. Minimum Quality/Quantity: In every instance, the quality level or quantity shown or specified is intended as minimum quality level or quantity of work to be performed or provided. Except as otherwise specifically indicated, the actual work may either comply exactly with that minimum (within specified tolerances), or may exceed that minimum within reasonable tolerance limits. In complying with requirements, indicated or scheduled numeric values are either minimums or maximums as noted or as appropriate for the context of the requirements. Refer instances of uncertainty to Owner or Engineer via a request for information (RFI) for decision before proceeding.

L. Abbreviations and Symbols: The language of Specifications and other Contract Documents including Drawings is of an abbreviated type in certain instances, and implies words and meanings which will be appropriately interpreted. Actual word abbreviations of a self-explanatory nature have been included in text of Specifications and Drawings. Specific abbreviations and symbols have been established, principally for lengthy technical terminology and primarily in conjunction with coordination of Specification requirements with notations on Drawings and in Schedules. These are frequently defined in Section at first instance of use or on a Legend and Symbol Drawing. Trade and industry association names and titles of generally recognized industry standards are frequently abbreviated. Singular words will be interpreted as plural and plural words will be interpreted as singular where applicable and where full context of Contract Documents so indicate. Except as otherwise indicated, graphic symbols and abbreviations used on Drawings and in Specifications are those recognized in construction industry for indicated purposes. Where not otherwise noted symbols and abbreviations are defined by 1993 ASHRAE Fundamentals Handbook, chapter 34 "Abbreviations and Symbols", ASME and ASPE published standards.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

B. Deliver products to the project at such time as the project is ready to receive the equipment, pipe or duct properly protected from incidental damage and weather damage.

C. Damaged equipment shall be promptly removed from the site and new, undamaged equipment shall be installed in its place promptly with no additional charge to the Owner.

1.12 SUBMITTALS

A. Coordinate with Division 01 for submittal timetable requirements, unless noted otherwise within thirty (30) days after the Contract is awarded. The Contractor shall submit an electronic copy of a complete set of shop drawings and complete data covering each item of equipment or material. The submittal of each item requiring a submittal must be received by the Architect or Engineer within the above thirty day period. The Architect or Engineer shall not be responsible for any delays or costs incurred due to excessive shop drawing review time for submittals received after the thirty (30) day time limit. The Architect and Engineer will retain a copy of all shop drawings for their files. All literature pertaining to items subject to Shop Drawing submittal shall be submitted at one time. Submittals shall be placed in one electronic file in PDF 8.0 format and bookmarked for individual specification sections. Individual electronic files of submittals for individual specifications shall not be permitted. Each submittal shall include the following items:

1. A cover sheet with the names and addresses of the Project, Architect, MEP Engineer, General Contractor and the Subcontractor making the submittal. The cover sheet shall also contain the section number covering the item or items submitted and the item nomenclature or description.
2. An index page with a listing of all data included in the Submittal.
3. A list of variations page with a listing all variations, including unfurnished or additional required accessories, items or other features, between the submitted equipment and the specified equipment. If there are no variations, then this page shall state "NO VARIATIONS". Where variations affect the work of other Contractors, then the Contractor shall certify on this page that these variations have been fully coordinated with the affected Contractors and that all expenses associated with the variations will be paid by the submitting Contractor. This page will be signed by the submitting Contractor.
4. Equipment information including manufacturer's name and designation, size, performance and capacity data as applicable. All applicable Listings, Labels, Approvals and Standards shall be clearly indicated.
5. Dimensional data and scaled drawings as applicable to show that the submitted equipment will fit the space available with all required Code and maintenance clearances clearly indicated and labeled at a minimum scale of 1/4" = 1'-0", as required to demonstrate that the alternate or substituted product will fit in the space available.
6. Identification of each item of material or equipment matching that indicated on the Drawings.
7. Sufficient pictorial, descriptive and diagrammatic data on each item to show its conformance with the Drawings and Specifications. Any options or special requirements or accessories shall be so indicated. All applicable information shall be clearly indicated with arrows or another approved method.
8. Additional information as required in other Sections of this Division.
9. Certification by the General Contractor and Subcontractor that the material submitted is in accordance with the Drawings and Specifications, signed and dated in long hand. Submittals that do not comply with the above requirements shall be returned to the Contractor and shall be marked "REVISE AND RESUBMIT".

B. Refer to Division 1 for additional information on shop drawings and submittals.

C. Equipment and materials submittals and shop drawings will be reviewed for compliance with design concept only. It will be assumed that the submitting Contractor has verified that all items submitted can be installed in the space allotted. Review of shop drawings and submittals shall not be considered as a verification or guarantee of measurements or building conditions.

D. Where shop drawings and submittals are marked "REVIEWED", the review of the submittal does not indicate that submittals have been checked in detail nor does it in any way relieve the Contractor from his responsibility to furnish material and perform work as required by the Contract Documents.

E. Shop drawings shall be reviewed and returned to the Contractor with one of the following categories indicated:
   1. REVIEWED: Contractor need take no further submittal action, shall include this submittal in the O&M manual and may order the equipment submitted on.
   2. REVIEWED AS NOTED: Contractor shall submit a letter verifying that required exceptions to the submittal have been received and complied with including additional accessories or coordination action as noted, and shall include this submittal and compliance letter in the O&M manual. The contractor may order the equipment submitted on at the time of the returned submittal providing the Contractor complies with the exceptions noted.
   3. NOT APPROVED: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is not approved, the Contractor will automatically be required to furnish the product, material or method named in the Specifications and/or drawings. Contractor shall not order equipment that is not approved. Repetitive requests for substitutions will not be considered.
   4. REVISE AND RESUBMIT: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is marked revise and resubmit, the Contractor will automatically be required to furnish the product, material or method named in the Specifications and/or provide as noted on previous shop drawings. Contractor shall not order equipment marked revise and resubmit. Repetitive requests for substitutions will not be considered.
   5. CONTRACTOR'S CERTIFICATION REQUIRED: Contractor shall resubmit submittal on material, equipment or method of installation. The Contractor's stamp is required stating the submittal meets all conditions of the contract documents. The stamp shall be signed by the General Contractor. The submittal will not be reviewed if the stamp is not placed and signed on all shop drawings.
   6. MANUFACTURER NOT AS SPECIFIED: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is marked manufacturer not as specified, the Contractor will automatically be required to furnish the product, material or method named in the specifications. Contractor shall not order equipment where submittal is marked manufacturer not as specified. Repetitive requests for substitutions will not be considered.

F. Materials and equipment which are purchased or installed without shop drawing review shall be at the risk of the Contractor and the cost for removal and replacement of such materials and equipment and related work which is judged unsatisfactory by the Owner or Engineer for any reason shall be at the expense of the Contractor. The responsible Contractor shall remove the material and equipment noted above and replace with specified equipment or material at his own expense when directed in writing by the Architect or Engineer.

G. Shop Drawing Submittals shall be complete and checked prior to submission to the Engineer for review.

H. Furnish detailed shop drawings, descriptive literature, table of contents listing all items being submitted at the beginning of each submittal package, physical data and a specification critique for each section indicating "compliance" and/or "variations" for the following items:
   1. Distribution Panelboards
   2. Panelboards
   3. Wiring Gutters
   4. Heavy Duty Disconnect Switches
   5. Lighting Fixtures
   6. Lighting Contactors
   7. Time Clocks
   8. Lighting Control System
   9. Photocells
   10. Wiring Devices and Plates
   11. Conduit and Fittings
   12. Wire
   13. General Purpose Dry Type Transformers
   14. Harmonic Mitigating Type Transformers
   15. Emergency Generator
   16. Automatic Transfer Switches
   17. Sound Reinforcing System
   18. Fire Alarm System
   19. Surge Protection Device (SPD)
   20. Lightning Protection

I. Refer to each specification section for additional requirements.

1.13 OPERATION AND MAINTENANCE MANUALS

A. Prepare maintenance manuals in accordance with Division 1 and in addition to the requirements specified in Division 1, include the following information for equipment items:
   1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
   2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
   3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
   4. Servicing instructions and lubrication charts and schedules.

1.14 COORDINATION DRAWINGS

A. Prepare coordination drawings to a scale of 1/4"=1'-0" or larger; detailing major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:
   1. Indicate the proposed locations of pipe, duct, equipment, and other materials. Include the following:
      a. Wall and type locations.
      b. Clearances for installing and maintaining insulation.
      c. Locations of light fixtures and sprinkler heads.
      d. Clearances for servicing and maintaining equipment, including tube removal, filter removal, and space for equipment disassembly required for periodic maintenance.
      e. Equipment connections and support details.
      f. Exterior wall and foundation penetrations.
      g. Routing of storm and sanitary sewer piping.
      h. Fire-rated wall and floor penetrations.
      i. Sizes and location of required concrete pads and bases.
      j. Valve stem movement.
      k. Structural floor, wall and roof opening sizes and details.
   2. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
   3. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
   4. Prepare reflected ceiling plans to coordinate and integrate installations, air distribution devices, light fixtures, communication systems components, and other ceiling-mounted items.

B. This Contractor shall be responsible for coordination of all items that will affect the installation of the work of this Division. This coordination shall include, but not be limited to: voltage, ampacity, capacity, electrical and piping connections, space requirements, sequence of construction, building requirements and special conditions.

C. By submitting shop drawings on the project, this Contractor is indicating that all necessary coordination has been completed and that the systems, products and equipment submitted can be installed in the building and will operate as specified and intended, in full coordination with all other Contractors and Subcontractors.

1.15 RECORD DRAWINGS

A. Maintain a continuous record during the course of construction of all changes and deviations in the work from the contract drawings. Upon completion of the work, purchase a set of "Auto Positive Tracings" on vellum and make corrections as required to reflect the electrical systems as installed. Location and size of all conduit shall be accurately shown to dimension. Submit three prints of the tracings for approval. Make corrections to tracings as directed and deliver "Auto Positive Tracings" to the Architect. Record drawings shall be furnished in addition to shop drawings. Symbols on the Record drawings shall correspond to the identification symbols on the contract drawings and equipment identification plates and tags.

B. The Contractor shall maintain a set of clearly marked black line record "AS-BUILT" prints on the job site on which he shall mark all work details, alterations to meet site conditions and changes made by "Change Order" notices. These shall be kept available for inspection by the Owner, Architect or Engineer at all times.

C. Refer to Division 1 for additional requirements concerning record drawings. If the Contractor does not keep an accurate set of as-built drawings, the pay request may be altered or delayed at the request of the Architect. Mark the drawings with a colored pencil. Delivery of as-built prints and reproducibles is a condition of final acceptance.

D. The record prints shall be updated on a daily basis and shall indicate accurate dimensions for all buried or concealed work, precise locations of all concealed pipe or duct, locations of all concealed valves, controls and devices and any deviations from the work shown on the Construction Documents which are required for coordination. All dimensions shall include at least two dimensions to permanent structure points.

E. Submit three prints of the tracings for approval. Make corrections to tracings as directed and delivered "Auto Positive Tracings" to the architect. "As-Built" drawings shall be furnished in addition to shop drawings.

F. When the option described in paragraph F., above is not exercised then upon completion of the work, the Contractor shall transfer all marks from the submit a set of clear concise set of reproducible record "AS-BUILT" drawings and shall submit the reproducible drawings with corrections made by a competent draftsman and three (3) sets of black line prints to the Architect or Engineer for review prior to scheduling the final inspection at the completion of the work. The reproducible record "AS-BUILT" drawings shall have the Engineers Name and Seal removed or blanked out and shall be clearly marked and signed on each sheet as follows:

CERTIFIED RECORD DRAWINGS

G. DATE:

(NAME OF GENERAL CONTRACTOR)

BY: _____

(SIGNATURE)

(NAME OF SUBCONTRACTOR)

BY: _____

(SIGNATURE)

1.16 CERTIFICATIONS AND TEST REPORTS

A. Submit a detailed schedule for completion and testing of each system indicating scheduled dates for completion of system installation and outlining tests to be performed and schedule date for each test. This detailed completion and test schedule shall be submittal at least 90 days before the projected Project completion date.

B. Test result reporting forms shall be submitted for review no later than the date of the detailed schedule submitted.

C. Submit 4 copies of all certifications and test reports to the Architect or Engineer for review adequately in advance of completion of the Work to allow for remedial action as required to correct deficiencies discovered in equipment and systems.

D. Certifications and test reports to be submitted shall include, but not be limited to those items outlined in Section of Division 26.

1.17 MAINTENANCE MANUALS

A. Coordinate with Division 1 for maintenance manual requirements, unless noted otherwise bind together in “D ring type” binders by National model no. 79-883 or equal, binders shall be large enough to allow 1/4” of spare capacity. Three (3) sets of all approved shop drawing submittals, fabrication drawings, bulletins, maintenance instructions, operating instructions and parts exploded views and lists for each and every piece of equipment furnished under this Specification. All sections shall be typed and indexed into sections and labeled for easy reference and shall utilize the individual specification section numbers shown in the Electrical Specifications as an organization guideline. Bulletins containing information about equipment that is not installed on the project shall be properly marked up or stripped and reassembled. All pertinent information required by the Owner for proper operation and maintenance of equipment supplied by Division 26 shall be clearly and legibly set forth in memoranda that shall, likewise, be bound with bulletins.

B. Prepare maintenance manuals in accordance with Special Project Conditions, in addition to the requirements specified in Division 26, include the following information for equipment items:
   1. Identifying names, name tags designations and locations for all equipment.
   2. Fault Current calculations and Coordination Study.
   3. Reviewed shop drawing submittals with exceptions noted compliance letter.
   4. Fabrication drawings.
   5. Equipment and device bulletins and data sheets clearly highlighted to show equipment installed on the project and including performance curves and data as applicable, i.e., description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and model numbers of replacement parts.
   6. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
   7. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions, servicing instructions and lubrication charts and schedules.
   8. Equipment name plate data.
   9. Wiring diagrams.
   10. Exploded parts views and parts lists for all equipment and devices.
   11. Color coding charts for all painted equipment and conduit.
   12. Location and listing of all spare parts and special keys and tools furnished to the Owner.
   13. Furnish recommended lubrication schedule for all required lubrication points with listing of type and approximate amount of lubricant required.

C. Refer to Division 1 for additional information on Operating and Maintenance Manuals.

D. Operating and Maintenance Manuals shall be turned over to the Owner or Engineer a minimum of 14 working days prior to the beginning of the operator training period.

1.18 OPERATOR TRAINING

A. The Contractor shall furnish the services of factory trained specialists to instruct the Owner's operating personnel. The Owner's operator training shall include 12 hours of onsite training in three 4 hour shifts.

B. Before proceeding with the instruction of Owner Personnel, prepare a typed outline in triplicate, listing the subjects that will be covered in this instruction, and submit the outline for review by the Owner. At the conclusion of the instruction period obtain the signature of each person being instructed on each copy of the reviewed outline to signify that he has a proper understanding of the operation and maintenance of the systems and resubmit the signed outlines.

C. Refer to other Division 26 Sections for additional Operator Training requirements.

1.19 SITE VISITATION

A. Visit the site of the proposed construction in order to fully understand the facilities, difficulties and restriction attending the execution of the work.

B. Before submitting a bid, it will be necessary for each Contractor whose work is involved to visit the site and ascertain for himself the conditions to be met therein in installing his work and make due provision for same in his bid. It will be assumed that this Contractor in submitting his bid has visited the premises and that his bid covers all work necessary to properly install the equipment shown. Failure on the part of the Contractor to comply with this requirement shall not be considered justification for the omission or faulty installation of any work covered by these Specifications and Drawings.

C. Understand the existing utilities from which services will be supplied; verify locations of utility services, and determine requirements for connections.

D. Determine in advance that equipment and materials proposed for installation fit into the confines indicated.

1.20 WARRANTY

A. The undertaking of the work described in this Division shall be considered equivalent to the issuance, as part of this work, of a specific guarantee extending one year beyond the date of completion of work and acceptance by Owner, against defects in materials and workmanship. Materials, appliances and labor necessary to effect repairs and replacement so as to maintain said work in good functioning order shall be provided as required. Replacements necessitated by normal wear in use or by Owner's abuse are not included under this guarantee.

B. All normal and extended warranties shall include parts, labor, miscellaneous materials, travel time, incidental expenses, freight/shipping, refrigerant, oils, lubricants, belts, filters and any expenses related to service call required to diagnose warranty problems.

1.21 TRANSFER OF ELECTRONIC FILES

A. Project documents are not intended or represented to be suitable for reuse by Architect/Owner or others on extensions of this project or on any other project. Any such reuse or modification without written verification or adaptation by Engineer, as appropriate for the specific purpose intended, will be at Architect/Owner's risk and without liability or legal exposure to Engineer or its consultants from all claims, damages, losses and expense, including attorney's fees arising out of or resulting thereof.

B. Because data stored in electric media format can deteriorate or be modified inadvertently, or otherwise without authorization of the data's creator, the party receiving the electronic files agrees that it will perform acceptance tests or procedures within sixty (60) days of receipt, after which time the receiving party shall be deemed to have accepted the data thus transferred to be acceptable. Any errors detected within the sixty (60) day acceptance period will be corrected by the party delivering the electronic files. Engineer is not responsible for maintaining documents stored in electronic media format after acceptance by the Architect/Owner.

C. When transferring documents in electronic media format, Engineer makes no representations as to the long term compatibility, usability or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by Engineer at the beginning of the Project.

D. Any reuse or modifications will be Contractor's sole risk and without liability or legal exposure to Architect, Engineer or any consultant.

E. The Texas Board of Architectural Examiners (TBAE) has stated that it is in violation of Texas law for persons other than the Architect of record to revise the Architectural drawings without the Architect's written consent.
   1. It is agreed that "MEP" hard copy or computer-generated documents will not be issued to any other party except directly to the Architect/Owner. The contract documents are contractually copyrighted and cannot be used for any other project or purpose except as specifically indicated in AIA B-141 Standard Form of Agreement Between Architect and Owner.
   2. If the client, Architect or Owner of the project requires electronic media for "record purposes", then AutoCAD/ Revit documents will be prepared by Engineer on electronic media such as removable memory devices, flash drives or CD's. These documents can also be submitted via file transfer protocols. AutoCAD/ Revit files will be submitted with all title block references intact to permit the end user to only view and plot the drawings. Revisions will not be permitted in this configuration.
   3. At the Architect/Owner's request, Engineer will assist the Contractor in the preparation of the submittals and prepare one copy of AutoCAD/ Revit files on electronic media or submit through file transfer protocols. The electronic media will be prepared with all indicia of documents ownership removed. The electronic media will be prepared in a ".rvt" or ".dwg" format to permit the end user to revise the drawings.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. The names and manufacturers and model numbers have been used in the Contract documents to establish types of equipment and standards of quality. Where more than one manufacturer is named for a specific item of equipment, only one of the specified manufacturers will be considered for approval. Where only one manufacturer is mentioned with the phrase "or approved equal", Contractor may submit an alternate manufacturer for consideration, provided the following conditions are met:
   1. Submit alternate equipment with complete descriptive data in shop drawing form. Provide sample of equipment upon request for review by Architect. Samples will be returned if requested in writing.
   2. Alternate equipment must be equal from the standpoint of materials, construction and performance.
   3. Alternate submittal must be presented to the Engineer/Architect ten (10) days prior to bid date for approval.

B. The Architect and Engineer shall be the sole judge of quality and equivalence of equipment, materials and methods.

2.2 PRODUCT LISTING

A. Products used on this project shall be listed by Underwriters' Laboratories.

2.3 ACCESS DOORS

A. Wherever access is required in walls or ceilings to concealed junction boxes, pull boxes, equipment, etc., installed under this Division, furnish a hinged access door and frame with flush latch handle to another Division for installation. Doors shall be as follows:
   1. Plaster Surfaces: Milcor Style K.
   2. Ceramic Tile Surfaces: Milcor Style M.
   3. Drywall Surfaces: Milcor Style DW.
   4. Install panels only in locations approved by the Architect.

2.4 EQUIPMENT PADS

A. Provide 4-inch-high concrete pads for indoor floor mounted equipment. Pads shall conform to the shape of the equipment with a minimum of 6 inch beyond the equipment. Top and sides of pads shall be troweled to a smooth finish, equivalent to the floor. External corners shall be bullnosed to a 3/4" radius, unless shown otherwise.

B. Provide 6-inch-high concrete pads for all exterior mounted equipment. Pads shall conform to the shape of the equipment with a minimum of 6 inch beyond the equipment. Provide a 4-foot monolithic extension to the pad in front of the equipment for service when mounted on a non-finished area (i.e. landscape, gravel, clay, etc.) Top and sides of pads shall be troweled to a smooth finish. External corners shall be bullnosed to a 3/4" radius, unless shown otherwise.

C. Where equipment pads are provided for service entrance equipment Provide elevation of pad a minimum of 8" thick, or 24" above flood plain at the service entrance location. Flood Plain elevation supersedes pad thickness. Construction of pad shall be the same as an 8" pad, with same strength, tension, and structural componens as required by 8" pad, continued through entire thickness of pad.

D. Provide a minimum 6-inch-high, steel reinforced concrete pad for generators. Pads shall be sized 6” larger that the outside perimeter dimensions. Provide a 4-foot monolithic extension to the pad around the equipment for service when mounted on a non-finished area (i.e. landscape, gravel, clay, etc.). Refer to structural details. Top and sides of pads shall be troweled to a smooth finish. External corners shall be bullnosed to a 3/4" radius, unless shown otherwise. The generator shall be bolted to the concrete pad per the manufacturers details.

E. Provide steel reinforced concrete pad for utility transformers. Pads shall comply with Utility Company Standards.

2.5 ESCUTCHEONS

A. Provide heavy chrome or nickel plated plates, of approved pattern, on conduit passing through walls, floors and ceilings in finished areas. Where conduit passes through a sleeve, no point of the conduit shall touch the building construction. Caulk around such conduit with sufficient layers of two hour rated firesafing by Thermafiber 4.0 P.C.F. density, U.S.G. fire test 4/11/78 and seal off openings between conduit and sleeves with non-hardening mastic prior to application of escutcheon plate. Escutcheons shall be Gravler Sure-Lock, or approved equal.

2.6 SPACE LIMITATIONS

A. Equipment shall be chosen which shall properly fit into the physical space provided and shown on the drawings, allowing ample room for access, servicing, removal and replacement of parts, etc. Adequate space shall be allowed for clearances in accordance with Code requirements. Physical dimensions and arrangement of equipment shall be subject to the approval of the Architect.

2.7 PAINTING

A. All factory assembled equipment for electrical work, except light fixtures, that normally is delivered with a factory applied finish shall be delivered with a hard surface factory applied finish such as baked-on machinery enamel which will not require additional field painting. The finish shall consist of not less than 2 coats of medium gray color paint USA No. 61 Munsell Notation 8-3G, 6. 10/0.54 enamel. This Contractor shall protect this finish from damage due to construction operations until acceptance of the building. He shall be responsible for satisfactorily restoring any such finishes or replacing equipment that becomes stained or damaged.

2.8 ELECTRICAL SYSTEM IDENTIFICATION

A. Conduit Systems: Provide adequate marking of major conduit which is exposed or concealed in accessible spaces to distinguish each run as either a power or signal/communication conduit. Except as otherwise indicated, use orange banding with black lettering. Provide self-adhesive or snap-on type plastic markers. Indicate voltage for that raceway. Locate markers at ends of conduit runs, on pull boxes, on junction boxes, near switches and other control devices, near items of equipment served by the conductors, at points where conduit passes through walls or floors, or enters non-accessible construction and at spacings of not more than 50 feet along each run of conduit. Switch-leg conduit and short branches for power connections do not have to be marked, except where conduit is larger than ¾ inch. Branch circuit conduits, junction boxes and pull boxes shall be marked with a permanent marker indicating panel name and branch circuit numbers.

B. Underground Cable Identification: Bury a continuous, preprinted, bright colored plastic ribbon cable marker with each underground cable (or group of cables), regardless of whether conductors are in conduit, duct bank, or direct buried. Locate each directly over cables, 6 to 8 inches below finished grade.

C. Identification of Equipment:
   1. All major equipment shall have a manufacturer's label identifying the manufacturer's address, equipment model and serial numbers, equipment size, and other pertinent data. Care shall be taken not to obliterate this nameplate in any way. Provide black back plate with white letters and numbers for normal equipment. Provide red back plate with white letters and numbers for optional emergency equipment. Provide yellow back plate with white letters and numbers for Life safety equipment.
   2. A black-white-black laminated plastic engraved identifying nameplate shall be secured by stainless steel screws to each automatic transfer switch, switchboard, distribution panel, motor control center, motor starter panels and panelboards.
      a. Identifying nameplates shall have ¼ inch high engraved letters and shall contain the following information:
         1) Name
         2) Voltage
         3) Phase
         4) "3" or "4" wire, and
         5) Where it is fed from.
      b. An example of a panelboard nameplate is:
         Center Panel – 1HB
         480/277 volt, 3 phase, 4 wire
         Center Fed from DP2
      c. An example of an automatic transfer switch nameplate is:
         Center ATS #2
         480/277 volt, 3 phase, 4 wire, 4 pole
         Center Fed from MSB and DPE
   3. Each feeder device in a switchboard, distribution panel, and motor control center device shall have a nameplate showing the load served in ½ inch high engraved letters.
   4. A black-white-black laminated plastic engraved identifying nameplate shall be secured by screws to each safety switch, disconnect switch, individual motor starter, enclosed circuit breaker, wireway, and terminal cabinet.
      a. Identifying nameplates shall have 1/4 inch high engraved letters and shall indicate the equipment served.

b. An example if a disconnect switch is: AHU-1.

5. Prohibited Markings: Markings which are intended to identify the manufacturer, vendor, or other source from which the material has been obtained are prohibited for installation within public, tenant, or common areas within the project. Also, prohibited are materials or devices which bear evidence that markings or insignias have been removed. Certification, testing (example, Underwriters' Laboratories, Inc.), and approval labels are exceptions to this requirement.
6. Warning Signs: Provide warning signs where there is hazardous exposure associated with access to or operation of electrical facilities. Provide text of sufficient clarity and lettering of sufficient size to convey adequate information at each location; mount permanently in an appropriate and effective location. Comply with recognized industry standards for color and design.
7. Operational Tags: Where needed for proper and adequate information on operation and maintenance of electrical system, provide tags of plasticized card stock, either preprinted or hand printed. Tags shall convey the message, example: "DO NOT OPEN THIS SWITCH WHEN BURNER IS OPERATING."

D. Identification of Wiring Devices
1. Contractor shall indicate the circuit serving each wiring device. Provide a typewritten label located on the inside face of the coverplate for all recessed mounted devices and on the outside face of the coverplate on all surface mounted devices.

PART 3 - EXECUTION

3.1 EXCAVATING AND BACKFILLING

A. Trenching and backfilling and other earthwork operations required to install the facilities specified herein shall conform to the applicable requirements of Division 2 (95% of maximum standard density). Where trenching or excavation is required in improved areas, the backfill shall be compacted to a condition equal to that of adjacent undisturbed earth and the surface of the area restored to the condition existing prior to trenching or excavating operations. Provide a minimum of 3" of sand underneath all conduits. The plans indicate information pertaining to surface and sub-surface obstructions; however, this information is not guaranteed. Should obstructions be encountered whether or not shown, the Contractor shall alter routing of new work, reroute existing lines, remove obstructions where permitted, or otherwise perform whatever work is necessary to satisfy the purpose of new work and leave existing surfaces and structures in a satisfactory and serviceable condition. All work shall comply with OSHA Standards.

3.2 WORKMANSHIP AND CONCEALMENT

A. The work of this Section shall be performed by workman skilled in their trade. Installation shall be consistent in completeness whether concealed or exposed. Each item of electrical work shall be concealed in walls, chases, under floors and above ceilings except:
1. Where shown to be exposed.
2. Where exposure is necessary to the proper function.

3.3 SLEEVES, CUTTING AND PATCHING

A. This section shall be responsible for placing sleeves for all conduit passing through walls, partitions, sound walls, beams, floors, roof, etc. Sleeves through below-grade walls shall use water-tight fitting manufactured by O-Z/Gedney.

B. Contractor shall install underground raceways including but not limited to feeders, service laterals, branch circuit and telecommunications. Contractor shall saw cut existing hard surfaces, when required for installation. Contractor shall patch surface to match existing conditions. Contractor shall replace all landscaping material when raceways are installed in these areas. Submit proposed method for patching for review.

C. All cutting and patching will be done under another Division, but this Section will be responsible for timely performance of this work and layout of holes and setting sleeves.

D. All un-used sleeves shall be sealed with 2 hour UL approved fire sealant manufactured by “3M” or approved equal.

E. Refer to 26 05 33 for additional requirements.

3.4 ELECTRICAL GEAR

A. Install all electrical equipment in accordance with the National Electrical Code and as shown on the drawings.

B. Lighting contactors, time clocks, fire alarm equipment, security equipment disconnect switches, etc. mounted in mechanical/electrical rooms shall be mounted at a working height not requiring a ladder, when wall space is available. Installation of these devices at greater elevations shall be approved by the Engineer. Contractor shall provide a coordination sketch of each mechanical/electrical room noting locations and mounting heights of all electrical devices (note bottom and top elevations) shown to be installed. Sketches shall be provided to the Engineer for review and the general contractor for coordination with other trades working in these rooms.

C. Fire retardant back boards secured to drywall studs may be used for contactors, time clocks, fire alarm equipment, security equipment, and disconnect switches 60 amp or smaller. All other wall mounted devices shall be mounted to unistrut. Unistrut shall be securely mounted to the floor and structural ceiling. Toggle bolts or anchor bolts attached to drywall is not acceptable.

3.5 CLEANING

A. Clean lighting fixtures and equipment.

B. Touch-up and refinish scratches and marred surfaces on panels, switches, starters, and transformers.

3.6 CORROSIVE AREAS

A. In areas of a corrosive nature, which include but are not limited to the following: pool equipment rooms, cooling towers and areas subject to salt air, etc., provide NEMA 4 X stainless steel or fiberglass reinforced enclosures for contactors, panel boards, controllers, starters, disconnects and materials used as supporting means (i.e. plastibond unistrut, pipe, fittings). The use of spray on coating may be acceptable in some applications.

3.7 TESTS AND INSPECTIONS

A. Tests and inspection requirements shall be coordinated with Division I.

B. Dallas ISD M&O represetantatives shall be present for all testing of electrical equipment and gear. Testing of Equipment and Gear shall be provided by installing contractor to ensure operations as intended and prove material is free from defects due to shipping, transport, assembly, install, etc.

C. Date for final acceptance test shall be sufficiently in advance of completion date of contract to permit alterations or adjustments necessary to achieve proper functioning of equipment prior to contract completion date.

D. Conduct re-tests as directed by Architect/Engineer, or owner, on portions of work or equipment altered or adjusted as determined to be necessary by final acceptance test. No resultant delay or consumption of time as a result of such necessary re-test beyond contract completion date shall relieve Contractor of his responsibility under contract.

E. Put circuits and equipment into service under normal conditions, collectively and separately, as may be required to determine satisfactory operation. Demonstrate equipment to operate in accordance with requirements of these specifications. Perform tests in the presence of Architect. Furnish instruments and personnel required for tests.

F. Final Inspection:
   1. At the time designated by the Architect, the entire system shall be inspected by the Architect and Engineer. The contractor or his representative shall be present at this inspection.
   2. Panelboards, switches, fixtures, etc., shall be cleaned and in operating condition.
   3. Certificates and documents required hereinbefore shall be in order and presented to the Architect prior to inspection.
   4. Panel covers, junction box covers, etc., shall be removed for visual inspection of the wire, bus bars, etc.
   5. After the inspection, any items which are noted as needing to be changed or corrected in order to comply with these specifications and the drawings shall be accomplished without delay.

G. The contractor shall provide a thermographic test using an independent testing laboratory using an infrared scanning device. This test shall include but not limited to all switchboards, distribution panelboards, panelboards, automatic transfer switches and other electrical distribution devices. This test shall be conducted to locate high temperature levels. This test shall be conducted between 3 to 8 months after occupancy, but not beyond the one year warranty period. Submit test to the architect and engineer using test reporting forms. All unacceptable conditions shall be corrected prior to the end of the warranty period.

END OF SECTION 26 02 00

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SECTION 26 02 01 - COORDINATION DRAWINGS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The requirements of the General Conditions 01 31 00 and Supplementary Conditions apply to all Work herein.

1.2 COORDINATION DRAWINGS

A. The Contractor shall take the lead in coordinating the Mechanical, Electrical, Plumbing, Communications, Electronic Safety/Security and Fire Protection systems within the building.

B. The Contractor shall coordinate a three-dimensional (3D) model of the building which includes the Mechanical, Electrical, Plumbing, and Fire Protection systems. The Mechanical, Electrical, Plumbing, and Fire Protection Contractors shall prepare their work and generate 3D models which will be given to the Contractor for coordination. The Contractor will be provided with the REVIT model that was used to generate the contract documents, this file may be used as the background file. The Contractor shall replace the systems drawn with the actual shop drawing models. The Contractor is not limited to using REVIT, but may use any 3-D software in generating and combining the coordination model.

C. Submitting the contract drawings as coordination drawings will not be acceptable.

D. The model shall include detailed and accurate representations of all equipment to be installed based upon the reviewed equipment submittals.

E. The Contractor shall hold a 3-D coordination meeting with all sub-contractors present to review the model and discuss coordination of the installation of the building systems.

F. Upon completion of the coordination meeting, the Contractor shall submit the 3-D model and 1/4" scale drawings for review.

G. The model shall detail major elements, components, and systems in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:
   1. Indicate the proposed locations of pipe, duct, equipment, and other materials. Include the following:
      a. Wall and type locations.
      b. Clearances for installing and maintaining insulation.
      c. Locations of light fixtures and sprinkler heads.
      d. Clearances for servicing and maintaining equipment, including tube removal, filter removal, and space for equipment disassembly required for periodic maintenance.
      e. Equipment connections and support details.
      f. Exterior wall and foundation penetrations.
      g. Routing of storm and sanitary sewer piping.
      h. Fire-rated wall and floor penetrations.
      i. Sizes and location of required concrete pads and bases.
      j. Valve stem movement.
      k. Structural floor, wall and roof opening sizes and details.

2. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
3. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
4. Prepare reflected ceiling plans to coordinate and integrate installations, air distribution devices, light fixtures, communication systems components, and other ceiling-mounted items.

H. Sequence of Coordination
1. Below is hierarchy of model elements and the sequencing by which the models will be coordinated:
   a. Structural and Architectural model
   b. Miscellaneous steel
   c. Perform preliminary space allocation
   d. Identify hard constraints (locations of access panels, lights, A/V space requirements, etc.)
   e. Main and medium pressure ducts from the shaft out
   f. Main graded plumbing lines and vents
   g. Sprinkler mains and branches
   h. Cold and hot water mains and branches
   i. Lighting fixtures and plumbing fixtures
   j. Smaller sized ducts and flex ducts
   k. Smaller size cold water and hot water piping, flex ducts, etc.

I. The Contractor shall not install any item until the coordination has been completed and reviewed by the Construction Manager, Owner, and A/E team.

J. This Contractor shall be responsible for coordination of all items that will affect the installation of the work of this Division. This coordination shall include, but not be limited to: voltage, ampacity, capacity, electrical and piping connections, space requirements, sequence of construction, building requirements and special conditions.

K. By submitting shop drawings on the project, this Contractor is indicating that all necessary coordination has been completed and that the systems, products and equipment submitted can be installed in the building and will operate as specified and intended, in full coordination with all other Contractors and Subcontractors.

END OF SECTION 26 02 01

SECTION 26 05 19 - WIRE, CABLE AND RELATED MATERIALS

PART 1 - GENERAL

1.1 SCOPE

A. Provide 600 volt building wire, cable and connectors and 300 volt wire, cable and connectors.

B. WORK INCLUDED: Include the following Work in addition to items normally part of this Section.
   1. Wiring for lighting and power.
   2. Automatic Control Wiring.
   3. Connection of equipment shown.
   4. Fire Alarm System.

C. WORK SPECIFIED ELSEWHERE:
   1. Heating, ventilating, and air conditioning equipment.
   2. Structured cabling system.
   3. Coaxial cables

1.2 REFERENCE STANDARDS

A. UL83

B. ASTM B-3

C. All wire cable and connectors shall be UL approved.

1.3 ACCEPTABLE MANUFACTURERS

A. 600 VOLT WIRE AND CABLE
   1. Southwire
   2. Encore
   3. Cerro

B. 300 VOLT WIRE AND CABLE
   1. Westpenn
   2. Beldon
   3. Alpha
   4. Tappan - Southwire

C. FLEXIBLE CABLE SYSTEMS
   1. AFC Modular Cable Systems
   2. Kaf-Tech

D. CONNECTORS
   1. Ilsco
   2. Cooper
   3. AMP - TYCO
   4. Burndy
   5. Ideal
   6. 3M

7. O.Z. Gedney
8. Thomas & Betts
9. Buchanan

1.4 SUBMITTALS

A. Shop drawings shall include, but not limited to:
   1. Cutsheets of wire, cable and connectors to indicate the performance, fabrication procedures, product variations, and accessories.

1.5 REQUIREMENTS OF REGULATORY AGENCIES WORK IN ACCORDANCE WITH:

A. National Electrical Code.

B. Local, municipal, or state codes that have jurisdiction.

PART 2 - PRODUCTS

2.1 WIRING

A. All wire shall be new and continuous without weld, splice, or joints throughout its length. It must be uniform in cross-section, free from flaws, scales and other imperfections.

B. WIRE MATERIAL: Conductors shall be soft drawn, annealed copper. Aluminum wiring is not acceptable UNLESS EXPRESSLY PERMITTED - IN WRITING - BY DALLAS ISD.

C. TYPES:
   1. Provide type “THHN/THWN-2” insulation for all buried feeders and service entrance conductors.
   2. Provide type “THHN/THWN-2” insulation for all branch circuits and above grade feeders.
   3. All wire No. 8 and larger shall be stranded. All wire No. 10 and smaller shall be stranded or solid.
   4. Provide type "XHHW" or other 90 degrees insulation wiring for branch circuit wiring installed through continuous rows of fixture bodies.
   5. All 300-volt cable including but not limited to telephone, fire alarm, data, CATV and security shall be UL listed for use in return air plenums.

D. CONDUCTOR SIZES
   1. Feeder conductors shall be sized for a maximum of 2% drop in rated voltage at scheduled load.
   2. Branch circuit conductors shall be sized for a maximum 3% drop in the rated voltage to the longest outlet on the circuit.
   3. Minimum wire shall be No. 12, unless otherwise shown on Drawings or required by Code.

E. COLOR CODING: No. 6 or larger shall use tape for color coding. No. 8 and smaller wire shall be color coded in accordance with the governing authority requirements or as follows:

   <u>120/208 Volt</u>

   Neutral: White
   Phase A: Black
   Phase B: Red
   Phase C: Blue

Ground: Green

277/480 Volt

Neutral: Gray
Phase A: Brown
Phase B: Purple
Phase C: Yellow
Ground: Green

2.2 GROUNDING

A. Permanently connect all conduit work, motors, starters, and other electrical equipment to grounding system in accordance with the National Electrical Code.

PART 3 - EXECUTION

3.1 WIRE

A. Do not pull wire into conduit until Work of an injurious nature is completed. Where two or more circuits run to a single outlet box, each circuit shall be properly tagged. Wyreze or approved equal may be used as a lubricant where necessary.

B. Splices shall be fully made up in outlet boxes with compression crimp-on type splice connectors.

C. Joints and splices will not be permitted in service entrance or in feeders. Joints in branch circuits will be permitted where branch circuits divide, and then shall consist of one through-circuit to which the branch shall be spliced. Joints shall not be left for the fixture hanger to make. Connect joints and splices with Buchanan Series "2000" solderless connectors complete with insulating caps or properly sized twist on wire nuts. “Wago” push-in connectors are not acceptable.

D. All stranded conductors shall be furnished with lugs or connectors.

E. Connectors furnished with circuit breakers or switches shall be suitable for copper wire termination.

F. “Sta-Cons” shall be used to terminate stranded conductors on all switches and receptacles.

G. All stranded #10 and small conductors shall be terminated with an approved solderless terminal if the device or light fixture does not have provisions for clamp type securing of the conductor.

H. The jacket for all travelers used on 3-way and 4-way switches shall be pink.

I. Route conductors for 480Y/277 systems in a separate raceway. Do not combine with 208Y/120 volt or 120/240 volt systems.

J. Emergency circuits shall not be routed with normal conductors.

3.2 BALANCING SYSTEM

A. The load on each distribution and lighting panel shall be balanced to within 10% by proper arrangement of branch circuits on the different phase legs. Provide written documentation showing results. Submit with O & M manuals.

3.3 LOW VOLTAGE WIRING

A. Low voltage wiring shall be plenum rated. All wiring in mechanical rooms, electrical rooms, drywall ceiling, inaccessible areas, underground, plaster ceiling, inside concealed walls areas exposed to occupant view, and other areas subject to physical damage shall be run in conduit.

B. Low voltage wiring shall be routed in separate raceways from power wiring systems.

C. Sleeves shall be placed in the forms of concrete, masonry and fire rated walls, floor slabs and beams, for the passage of wiring. Sleeves should be set in place a sufficient time ahead of the concrete work so as not to delay the work. Sleeves shall be rigid galvanized steel.

D. Provide Caddy J-hooks supported independently from other system to support cable at 4-foot on center or closer if required by manufacture.

E. Provide a junction box to make up all joints and splices.

3.4 CABLE SUPPORTS

A. Provide cable supports in all vertical raceways in accordance with Article 300-19 of the NEC.

3.5 DEFECTS

A. Defects shall include, but are not to limited to, the following:
   1. Tripping circuit breakers under normal operation.
   2. Improperly connected equipment.
   3. Damaged, torn, or skinned insulation.

END OF SECTION 26 05 19

SECTION 26 05 26 - GROUNDING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

1.2 SCOPE

A. WORK COMBINED WITH OTHER SECTIONS: Combine the work specified herein with the following Sections to form a single responsibility for the Work:
   1. Electrical.
   2. Basic materials and methods.

B. Provide electrical service, equipment and wiring device grounding as shown, scheduled and as specified.

C. The types of grounding include, but not limited to, the grounding bonding of all equipment devices, building steel piping, and as required by the National Electrical Code, Local Inspection Department and Power Company.

1.3 STANDARDS

A. National Electrical Code (NFPA-70)

B. Local municipal and State codes that have jurisdiction.

C. NECA

1.4 ACCEPTABLE MANUFACTURES

A. Provide grounding products manufactured by Copperweld and Cadweld.

1.5 SUBMITTALS

A. Shop drawings shall include, but not limited to the following:
   1. Cut sheets of ground rods, clamps and connectors.
   2. Grounding system diagram.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide all materials required to construct a complete grounded electrical system.

B. GROUND RODS: Ground rods shall be 3/4" inch diameter by 10 feet long construction with copper jacket and a steel core.

C. CLAMPS: Ground clamps shall be copper except for steel or iron pipes in which the clamps shall be galvanized iron.

D. CONDUCTORS: Conductors shall be connected by means of an approved pressure connector or clamp.

PART 3 - EXECUTION

3.1 INSTALLATION

A. GENERAL: Install grounding system as shown and specified to ensure a properly grounded system.

B. SERVICE ENTRANCE GROUNDING SYSTEM: Provide a main bonding jumper between the neutral and ground bus of each switchboard. Route a separate grounding electrode conductor in conduit from each main gutter to the ground rod grid, incoming cold water piping system, and to the "lightning protection system" (250 - 106 of NEC) under ground bonding loop. Provide a bonding jumper around water meter. The grounding electrode conductor shall be stranded copper, 98% conductivity and shall be run continuous without splices or joints and installed at least 12" below grade.

C. BUILDING STEEL AND PIPING SYSTEM: Install a bonding jumper between building steel and metallic piping systems to bond them to the electrical grounding system.

D. NEUTRAL: The neutral shall be grounded only at the service entrance and other separately derived systems. The neutral shall be kept separate from the grounding system and shall not be used as a ground.

E. GROUNDING SEPARATELY DERIVED ALTERNATING CURRENT SYSTEM
   1. TRANSFORMERS: The center point (neutral) of each wye connected transformer shall be bonded to the case and the grounding electrode conductor shall be connected to the grounded conductor (neutral).
   2. STANDBY EMERGENCY GENERATOR: The generator neutral shall be bonded to the generator when a 4-pole switched neutral automatic transfer switch is specified.

F. GROUNDING CONDUCTOR: A grounding conductor and metallic conduit system shall bond all equipment served by the electrical system. Provide a flexible bonding jumper for isolated metallic piping and ductwork and around expansion fittings and joints.

G. CONDUIT GROUNDING BUSHING: Conduit terminating in equipment that has a ground bus such as switchboards, panelboards, etc., shall have grounding bushings installed. Ground each conduit by means of a grounding bushing and to the ground bus in the equipment.

H. MOTORS: The frame of all motors shall be grounded.

I. SPECIAL GROUNDING: Provide a #6 AWG copper grounding conductor for each telephone board, television system, etc. Terminate the grounding conductor on ground bus and to the building electrical grounding system. Refer to 800-40(d) and 820-40(d) of the NEC.

J. REMOTE PANELBOARDS: Provide a grounding electrode conductor all remote panels as required by the NEC and shown on drawings.

K. LIGHTING FIXTURES: Flexible fixture whips containing a green grounding conductor shall be used to connect light fixtures. Flexible fixture whips shall not exceed ten feet.

L. RECEPTACLES: All receptacles shall be grounded using the branch circuit grounding conductor. Receptacles shall use an approved grounding yoke.

3.2 TESTING

A. Perform a ground resistance test using a biddle analog or digital portable earth/ground resistance tester. The system resistance shall not exceed 5 Ohms. Provide additional electrodes as required (refer to 250-84 and 250-56 of the most current edition NEC). Test shall not be conducted following wet weather. Provide personal instruments to conduct these tests and submit certified test for review. Test shall be verified by Engineer.

END OF SECTION 26 05 26

SECTION 26 05 33 - RACEWAYS

PART 1 - GENERAL

1.1 SCOPE

A. Provide electrical raceways and fittings as shown, scheduled and specified.

B. The types of raceways and fittings required are as follows:
   1. Rigid hot-dipped galvanized steel conduit (GRC) (RMC)
   2. Intermediate hot-dipped galvanized steel conduit (IMC)
   3. Electrical metallic tubing (EMT)
   4. PVC (Sch. 40 & 80)
   5. Flexible metal conduit (FMC)
   6. Liquid-tight flexible metal conduit (LFMC)
   7. PVC coated rigid galvanized steel conduit
   8. Rigid Aluminum Conduit (RAC)

1.2 STANDARDS

A. ANSI, C80.1 & C80.3

B. NEMA FB-1

C. NEMA TC3

D. UL, 6, 797 & 1242

1.3 ACCEPTABLE MANUFACTURERS

A. Raceways
   1. Allied
   2. Republic
   3. Prime Conduit (Carlon)
   4. Wheatland Tube
   5. Cantex
   6. Western Tube
   7. Robroy Industries

B. Fittings
   1. Appleton
   2. Crouse Hinds
   3. Steel City
   4. O.Z. Gedney
   5. Carlon
   6. Raco, Inc.
   7. Bridgeport

C. Boxes
   1. RACO
   2. Thomas and Betts

3. EATON
4. Crouse-Hinds
5. Appleton

D. Surface
1. Hubbell
2. Wiremold

1.4 SUBMITTALS

A. Product data shall include but not be limited to:
1. Cutsheets for raceways, fitting, solvents, primers, etc.

1.5 REQUIREMENTS OF REGULATORY AGENCIES WORK IN ACCORDANCE WITH:

A. National Electrical Code.

B. Local, municipal, or state codes that have jurisdiction.

PART 2 – PRODUCTS

2.1 CONDUIT AND FITTINGS

A. Rigid Galvanized Steel Conduit.
1. Hot-dip galvanized rigid steel conduit, galvanized after fabrication. Products shall comply with UL6 and ANSI C80.1. All threads shall be galvanized after cutting. A uniform zinc coating shall be applied to the inner and outer walls.
2. Fittings shall be threaded and shipped with thread protectors.

B. Aluminum Rigid Conduit
1. Rigid aluminum (alloy 6063-T1) conduit shall be manufactured using 606 3 Alloy in temper designation T-1. Products shall comply with UL6A and ANSI 680.5
2. Fittings for rigid aluminum conduit shall be threaded aluminum shipped with thread protectors.

C. PVC Coated Rigid Galvanized Steel Conduit.
1. Conduit shall be same as rigid metal conduit with a factory-applied 40-mil-thick covering of polyvinyl chloride (PVC) bonded to the metal.
2. Fittings shall be the same as rigid metal conduit fittings with a factory-applied, 40-mil-thick covering of polyvinyl chloride (PVC) bonded to the metal

D. Intermediate Metal Conduit (IMC).
1. Conduit shall be similar to rigid steel conduit except thinner wall.
2. Fittings shall be threaded hot-dipped galvanized and shipped with thread protectors.

E. Electrical Metallic Tubing (EMT).
1. EMT shall be made of hot-dip galvanized strip steel. The interior shall be coated with a corrosion-resistant lubricant for ease of wiring pulling.

F. Rigid Nonmetallic Conduit (PVC).
1. Conduit shall be schedule 40 or 80 polyvinyl chloride (PVC), UV stabilized, rated for 90°C conductors.

2. Fittings shall be solvent weld socket type.

G. Flexible Metal Conduit (Greenfield).
   1. Spirally wound continuously interlocked zinc coated strip steel.
   2. Fittings shall be one screw for smaller than 1-1/2-inch, two screw for 1-1/2-inch and larger, double clamp steel or malleable iron, either cadmium plated or hot-dip galvanized.

H. Liquid-Tight Flexible Steel Conduit (Seal Tite).
   1. Spirally wound continuously interlocked zinc coated strip steel with a UV stabilized polyvinyl chloride (PVC) outer jacket bonded to the conduit.
   2. Fittings shall be compression type, malleable iron, with insulated throat, either cadmium plated or hot-dip galvanized.

2.2 PULL BOXES

A. Exterior in-ground pull boxes shall be concrete or polymer as manufactured by Brooks, Dalworth, Hubbell Quazite, or approved equivalent. Covers shall include identification of systems contained.

B. Pull boxes in pole bases shall be as manufactured by Carlon.

2.3 WIREWAYS

A. Wireways shall be made of not less than 16-gauge sheet steel for 4 inch and 6 inch square sizes and 14 gauge steel for 8 inch and 12 inch square sizes. Couplings end plates, and knockouts shall be furnished as required. Each section of wireways shall be rigidly supported.

B. The finish shall be ANSI-49 gray epoxy paint applied by a cathodic electrode position paint process over a corrosion resistant phosphate preparation for NEMA 1 wireways. Provide galvanized steel for NEMA 3R wireways. NEMA 3R wireways and auxiliary gutters are for horizontal mounting only.

2.4 FITTINGS

A. Couplings for rigid steel or intermediate conduit shall be hot dipped galvanized steel. Set screw type is not acceptable.

B. Steel or malleable iron fittings shall be used on all other raceway types except for PVC. Die-cast fittings are not allowed.

C. Couplings for aluminum raceways shall be threaded aluminum.

D. EMT systems shall utilize steel insulated throat, threadless, water tight compression type connectors and threadless steel water tight compression type couplings.

E. Coupling and connectors accessories and fittings for PVC coated rigid galvanized steel shall be PVC coated.

F. Liquidtight Flexible Metal Conduit (LFMC) fittings shall be steel. Plastic is not acceptable.

G. Provide nylon bushing on end of all low voltage cabling system conduits (sleeves, rough-ins, etc.).

2.5 GRADE-BEAM SLEEVES

A. It shall be required of the electrical contractor to provide (4) 6" conduit sleeves through the exterior grade beams of suspended foundation builiding, cap both ends.

B. For slab-on-grade facilities, provide (4) 4" conduit from central IDF Room stubbed outside of building within 5ft of building perimeter, capped on both ends. conduit shall extend to the building perimeter in the direction of the space available for future expansion.

PART 3 - EXECUTION

3.1 PROVIDE CONDUIT AS FOLLOWS:

A. GENERAL: The Drawings are diagrammatic, and are intended to show the general location of outlets, devices, fixtures, and arrangement and control of circuits. The Contractor shall determine exact locations by actual measurement of the building or by reference to the Architectural Drawings.

B. Except as noted or otherwise specified, all wiring shall be installed in galvanized rigid steel, rigid aluminum conduit or electrical steel tube (EMT) of the proper size to contain the number of conductors required in accordance with the latest edition of the N.E.C. Where conduit sizes are shown on the drawings, these shall take preference. Contractor shall epoxy coat galvanized rigid steel conduit for use in natatoriums.

C. Raceways shall not be routed below or within slab-on-grade, foundations, or below grade of suspended slab structures, unless specifically noted or indicated otherwise on plan.

D. EMT in sizes up to 4 inches when concealed or not exposed to damage and located indoors only. (EMT is not acceptable in wet and damp location.)

E. PVC coated rigid galvanized steel shall be used for all penetrations of slab on grade.

F. Rigid galvanized steel where embedded in concrete or masonry construction, mechanical yard or in exterior/interior applications where subject to damage.

G. Rigid aluminum shall be used in exterior applications. (i.e. roof, top of canopies)

H. PVC schedule 40 and 80 may be utilized underground, in or below slab where shown on the construction documents.

I. MINIMUM SIZE: 3/4 inch.

J. PVC coated rigid galvanized steel conduit shall be coated inside and outside.

K. PVC coated rigid galvanized steel conduit shall be used at cooling towers, corrosive areas and pool pump rooms.

L. Fixture whips: Refer to 26 51 19 for additional information.

M. Flexible metal shall be used for connecting rotating equipment installed in conditioned spaces.

N. Liquidtight Flexible Metal Conduit (LFMC) shall be used for connecting rotating equipment installed in non-conditioned spaces and outside.

O. Of such size, and so installed that conductors may be drawn in without injury or excessive strain.

P. Where entering panels, pull boxes, junction boxes, or outlet boxes, shall be secured in place with lock nuts inside and outside, and insulated bushings inside.

Q. Have Red seal type VCC or approved equal cable supports in risers, as required by N.E.C.

R. Have ends reamed after cutting and application of die.

S. Keep conduit corked and dry during construction, and swab out before conductors are pulled.

T. Have bends and offsets made with approved tools. Bends or offsets in which the pipe is crushed or deformed shall not be installed.

U. Where not embedded in concrete or masonry, be firmly secured by approved clamps, half-straps or hangers.

V. Have O.Z. Gedney or approved equal expansion fittings where crossing building expansion joints.

W. Except in the mechanical equipment rooms, run conduit concealed, and by the shortest practicable route between outlets. Install risers, drops, and offsets necessary to avoid conflict with ductwork, piping, structural members, and similar items.

X. Install exposed conduit in mechanical rooms, and elsewhere as indicated, parallel to horizontal and vertical lines of walls, ceilings, and floors.

Y. Fixtures in finished areas having suspended acoustical ceilings shall be connected to outlet boxes of lighting grid by flexible metal conduit; length not to exceed ten feet (six feet if using 3/8" manufactured fixture "whips").

Z. Outlet boxes in partitions shall never be set back to back. They shall be offset to prevent undue noise transmission from room to room.

AA. Concealed conduit shall run in as direct manner as possible using long bends. Exposed conduit shall be run parallel with or at right angles to the lines of the building; and all bends shall be made with standard conduit elbows or conduit benders. Not more than equivalent of four quarter bends shall be used in any run between terminals and cabinet, of between outlet or junction boxes. Approved condulets shall be used in lieu of conduit elbows where ease of installation and appearance warrants their use and approved by the engineer. Conduit joints shall be made with approved couplings and unions.

BB. Conduits shall be continuous from outlet to outlet and from outlets to cabinets, junction or pull boxes and shall be electrically continuous throughout. Terminals of all conduits shall be provided with double lock nuts and bushing or terminated on conduit hubs. Use of running threads is prohibited.

CC. Each entire conduit system shall be installed complete before any conductors are drawn in. Every run of conduit shall be finished before covering up to guard against obstructions and omissions.

DD. Sleeves shall be placed in the forms of concrete, masonry and fire rated walls, floor slabs and beams, for the passage of conduits. Sleeves should be set in place a sufficient time ahead of the concrete work so as not to delay the work. Sleeves shall be rigid galvanized steel with a minimum thickness of 1.07MM and set to extend 4” above slab.

EE. All pipe penetrations through walls and concrete floors shall be fire rated by applying USG Thermafiber in the space between the concrete and the pipe. The fire rating shall be additionally sealed by using 3M brand model CP 25 or 303 fire barrier caulk and putty. All fire rating material shall be installed in accordance with manufacturer`s printed instructions.

FF. All conduit shall be cleaned and swabbed to remove all foreign matter and moisture prior to pulling wire and cable. All boxes in which conduits terminate shall be cleaned of all concrete mortar and other foreign matter.

GG. Provide #30 nylon pulling line in all conduits in which permanent wiring is not installed.

HH. All conduit shall be securely fastened and supported using hot galvanized malleable iron one-hole pipe straps, clamps, hanger or other means approved by the engineer. Supports shall be as required per NEC. Tie wire shall not be used as support or securing means. Support conduit independently of ceiling hanger wire. Use all thread rods to support outlet boxes, junction boxes and conduit.

II. When PVC conduit is routed underground, all stub-up`s and bends 15° and greater shall be PVC coated rigid galvanized steel. Use PVC coated rigid galvanized steel when penetrating concrete on grade.

JJ. Flexible and liquid-tight flexible steel conduit shall be used for final connections to utilization equipment. Liquid-tight flexible steel conduit shall be used for all exterior locations and all interior locations subject to moisture, vibrations, rotating equipment and dry-type transformers. Refer to Section 26 02 00 for additional information concerning flexible steel conduit. LFNC may be used in lieu of flexible steel conduit where allowed by the NEC and the City of San Antonio.

KK. Contact the Architect and Engineer for an installation review before covering any below grade or above grade conduit.

LL. All new outlets shall be flush mounted. In remodeled areas where wall construction prohibits flush mounting, provide Hubbell 2400 series, unless noted otherwise. Verify exact location and routing with architect before installation.

MM. Contractor shall not penetrate water proof barriers without using proper fitting to maintain barriers. This shall include exterior walls and slabs. Coordinate with Architect for proper methods.

3.2 CONDUIT CORROSION PROTECTION

A. Branch circuit conduits installed in concrete slabs on fill or grade shall be positioned in a manner to ensure complete concrete cover. In no case shall such conduits be exposed below or above the slab surfaces, or penetrate the waterproof membrane.

B. At locations where metallic conduits pass through slabs on grade or transitions below grade, PVC coated rigid galvanized conduit shall be used. Contractor may use 3M corrosive protective tap on rigid galvanized conduit in lieu of PVC coated rigid galvanized conduit.

C. Conduit installed in the air gap between the water-resistant barrier and finish brick shall not exceed 2-ft. in length.

3.3 EXPANSION JOINTS

A. Install approved expansion fitting in all conduit runs in excess of 150 feet or when crossing building expansion joints.

3.4 OUTLET AND JUNCTION BOXES

A. Provide an approved galvanized outlet box with adequate volume for number of conductors installed.

B. Provide standard galvanized switch boxes of the required number of gangs. Switch boxes where conduit is exposed shall be handy boxes or approved equal.

C. Outlet boxes for receptacles shall be similar to Universal 52151 with suitable raised cover. Receptacle boxes where conduit is exposed shall be handy boxes or approved equal.

D. Weatherproof boxes shall be FS or FD. Provide these boxes in all non-conditioned areas, exterior areas and natatoriums.

E. Outdoor boxes shall be NEMA 3R, with conduit connections made by Myers Hubs.

F. See notes and details on Drawings for special box requirements.

G. Provide junction boxes required to facilitate installation of the various conduit systems. Provide support boxes required for risers, each complete with approved cable supports as described elsewhere in this Division.

H. Outlet boxes for drywall shall be standard galvanized 4" square boxes with the appropriate device cover. Secure all outlet boxes with a backing brace connected to two adjacent studs. Mounting brackets with a single ear to rest against the backing sheet rock are not acceptable.

I. Provide floor outlet fittings for telephone to match fittings for duplex floor receptacles.

J. Provide 3-1/2” deep gangable masonry boxes in all masonry wall (CMU). Steel City GW-135-G or approved equal.

K. Provide shallow 4”x4” boxes in all demountable partitions.

L. Metallic boxes located in fire rated walls or partitions shall be separated by a minimum horizontal distance of 24 in. This minimum separation distance between metallic boxes may be reduced when “ Wall Opening Protective Materials” (CLIV) are installed according to the requirements of their Classification. Metallic boxes shall not be installed on opposite side of walls or partitions of staggered stud construction unless “Wall Opening Protective Materials” are installed with the metallic boxes in accordance with Classification requirements for the protective materials.

M. Junction, pull boxes, condulets, gutters, disconnects, contactors, etc., above 2-foot x 2-foot grid ceilings shall be mounted within 18-inches of ceiling grid. Above 2-foot x 4 – foot grid ceiling they shall be mounted within 30-inches of ceiling grid. All junction box, pull box, gutter openings shall be side or bottom accessible.

N. Junction boxes are prohibited above drywall or plaster ceilings except for lighting; and those must be mounted directly over light fixture opening. Route power, PA, fire alarm conduits to nearest lay-in ceiling.

3.5 THRU-WALL SEALS

A. Provide O.Z. Gedney “Thru-wall” seals for all conduits passing through concrete structure below grade, above grade, and floor penetrations below grade. These prevent moisture from entering the building.

B. Straight sleeves are not acceptable.

3.6 PULL BOXES

A. Interior Pull boxes shall be provided for conduit systems as required and shall be constructed of galvanized steel of not less than gauge and size specified by National Electrical Code. Size pull boxes per NEC 314.28.

B. Where two or more feeders pass through a common pull box, they shall be tagged to indicate clearly their electrical characteristics, circuit number, and panel designation.

C. Exterior in-ground pull boxes shall have open bottoms with sand and rock beds below box for drainage of water. Provide closed bottom boxes where specified. Closed bottom boxes shall be provided with sumps for portable pump to allow for extracting water. Refer to details on the drawings.

D. Pull boxes mounted in pole bases shall be coordinated with the pour of the pole base and shall be flush with finished footing.

3.7 WIREWAYS

A. Wireways shall be installed as indicated or required and locations shall be coordinated with architect.

B. Wiring in wireways shall be neatly bundled, tied and suitably tagged.

3.8 UNDERGROUND DUCTBANK SYSTEM

A. DUCT SYSTEM

1. The duct system shall consist of Schedule 40 PVC or type 1-EB PVC conduits encased in red concrete as detailed on the drawings. Use rigid conduit for stub-ups and the last ten feet at the end of each ductbank. Duct lines shall be laid to a minimum grade of 4 inches per 100 feet and shall be free from either horizontal or vertical waves. Duct lines shall be straight unless otherwise noted on the drawings. Duct lines shall be installed so that the top of concrete in encased duct lines is not less than 24 inches below finished grade or finished paving at any point. Changes in direction or runs exceeding a total of 10 degrees, either vertical or horizontal, shall be accomplished by long sweep bends having a minimum radius of curvature of 5 feet. The long sweep bends may be made up of one or more curved or straight sections and/or combinations thereof using five degree angle couplings. Conduit shall be thoroughly cleaned before using or laying. During construction and after the duct line is completed, the ends of the conduit shall be plugged to prevent water washing mud into the conduits. Particular care shall be taken to keep the conduits clean of concrete, dirt, and any other substance during the course of construction.
2. Each single conduit of the duct bank shall be completely encased in steel reinforced concrete as indicated. The thickness of concrete encasement indicated is the minimum thickness, and may be increased to fit the actual shape of trench.
3. Concrete for duct bank envelopes shall be standard 2000 psi concrete mix as described in Division 03, and be colored deep red for permanent marking of underground electrical work. The concrete red pigment shall be pure inorganic natural metallic base pigment, approved by the Engineer before use. Organic pigments will not be permitted. The approved pigments shall be mixed four pounds per yard of cement.
    a. Envelopes may be poured directly against sides of trenches if the "cut" is clean, even and free of loose material. All loose dirt and extraneous material shall be removed from the trenches before and during the pouring of concrete to ensure sound envelopes. Concrete shall be carefully spaded during pouring to eliminate all voids under and between the conduit and honeycombing of the exterior surfaces. Power driven tampers of agitators shall not be used, unless specifically designed for the application, in order to ensure that the water-tightness of the conduits is not destroyed.
    b. Generally, each run of envelopes shall be poured in one continuous operation. Where more than one pour is necessary, each pour shall terminate in a vertical plane. Partial pours shall not terminate in horizontal or angular planes.

B. For normal underground installation see Section 26 02 00, paragraph 3.1 for Excavating and Backfilling.

END OF SECTION 26 05 33

SECTION 26 08 00 - COMMISSIONING OF ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract Documents, including General and Supplementary Conditions and Division 01 Specifications, apply to this section.

1.2 RELATED SECTIONS

A. Section 23 09 63 - Energy Management and Control System (EMCS)

1.3 SUMMARY

A. The commissioning of the lighting system and associated controls shall be performed by an impartial technical firm hired by the owner or shall be performed by the installing contractor if the owner has not hired a commissioning firm. The commissioning provider shall be certified under one or more of the following certifications:
   1. CxA - Certified Commissioning Authority - ACG
   2. CBCP - Certified Building Commissioning Professional - AEE
   3. CCP - Certified Commissioning Professional - BCA
   4. CPMP - Certified Process Management Professional - ASHRAE
   5. BSC - Building System Commissioning Certification - NEBB

B. The commissioning provider (Commissioning authority) shall be responsible for leading the entire construction team through the commissioning process including, but not limited to, conducting the commissioning kick-off meeting, preparing the commissioning plan, preparing pre-functional checklists, preparing functional test scripts, participation in functional testing and preparation of required documentation and reports.

1.4 RESPONSIBILITIES

A. Contractor: Responsibilities of the Contractor as relate to Commissioning Process include, but are not limited to the following:
   1. Facilitate coordination of Commissioning work by Commissioning authority.
   2. Attend Commissioning meetings or other meetings called by Commissioning authority to facilitate the Commissioning Process.
   3. Review Functional Performance Test procedures for feasibility, safety, and impact on warranty, and provide Commissioning authority with written comment on same.
   4. Provide all documentation relating to manufacturer’s recommended performance testing of equipment and systems.
   5. Provide Operations & Maintenance data to Commissioning authority for preparation of checklists and training manuals.
   6. Provide As-built drawings and documentation to facilitate Testing.
   7. Assure and facilitate participation and cooperation of Sub Contractors and equipment suppliers as required for the Commissioning Process.
   8. Certify to Commissioning authority that installation work listed in Pre-Functional Checklists has been completed.

9. Install systems and equipment in strict conformance with project specifications, manufacturer's recommended installation procedures, and Pre-Functional Checklists.
10. Provide data concerning performance, installation, and start-up of systems.
11. Provide copy of manufacturers filled-out start-up forms for equipment and systems.
12. Ensure systems have been started and fully checked for proper operation prior to arranging for Testing with Commissioning authority. Prepare and submit to Commissioning authority **written** certification that each piece of equipment and/or system has been started according to manufacturer's recommended procedure, and that system has been tested for compliance with operational requirements.
    a. Contractor shall carry out manufacturer's recommended start-up and testing procedures, regardless of whether or not they are specifically listed in Pre-Functional Checklists.
    b. Contractor is not relieved of obligation for systems/equipment demonstration where performance testing is required by specifications, but a Functional Performance Test is not specifically designated by Commissioning authority.
13. Coordinate with Commissioning authority to determine mutually acceptable date of Functional Performance Tests.
14. Provide qualified personnel to assist and participate in Commissioning.
15. Provide test instruments and communications devices, as prescribed by Commissioning authority, required for carrying out Testing of systems.
16. Proprietary test equipment required by the manufacturer, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate its use, and assist in the commissioning process. Proprietary test equipment shall become the property of the Owner upon completion of commissioning.
17. Ensure deficiencies found in the Commissioning Issues Log are corrected within the time schedule shown in the Commissioning Plan.
18. Provide Commissioning authority with all submittals, start-up instructions manuals, operating parameters, and other pertinent information related to Commissioning Process. This information shall be routed through Architect.
19. Provide commissioning authority with a certificate of readiness to show systems are ready to schedule functional testing.
20. Prepare and submit to Commissioning authority proposed Training Program outline for each system.
21. Coordinate and provide training of Owner's personnel.
22. Prepare Operation & Maintenance Manuals and As-Built drawings in accordance with specifications; submit copy to Commissioning authority in addition to other contractually required submissions. Revise and resubmit manuals in accordance with Design Professionals and Commissioning authority's comments.
23. Commissioning requires participation of this Division Subcontractors to ensure that systems are operating in manner consistent with Contract Documents. All costs associated with the participation of Contractor, Sub-Contractors, Design Professionals, and Equipment Vendors in the Commissioning Process shall be included as part of the Construction Contract.
24. Provide a qualified and owner approved representative to attend 'End of Warranty' testing. End of Warranty testing will be arranged by the Owner as Warranties near expiration. Contractor shall assume that multiple attendances shall be required, and not limited to a single 'end of warranty' meeting.

B. Subcontractors and vendors shall prepare and submit to Commissioning Agent proposed Startup procedures to demonstrate proper installation of systems, according to these specifications and checklists prepared by Commissioning authority.

C. Electrical contractor shall provide a letter certifying the installed lighting controls meet documented performance criteria specified in the commissioning plan within 90 days of substantial completion.

1.5 COMMISSIONING PLAN

A. Commissioning Process tasks and activities:
   1. Commissioning kick-off meeting: Conducted by commissioning authority and attended by construction team and design team.
   2. Pre-functional checklists: Prepared by the commissioning authority and filled out by subcontractors performing the work that is applicable.
   3. Site visits to review installation of applicable systems and progress of checklist documentation performed and reported by commissioning authority.
   4. Functional testing: Commissioning authority shall conduct functional testing with assistance of applicable subcontractors and document successful results as well as deficiencies (issues). Functional performance testing shall demonstrate the installation and operation of components, systems, and system-to-system interfacing in accordance with plans and specifications.
   5. Preliminary commissioning report: Commissioning authority shall issue a preliminary commissioning report to the owner that has results of the first round of functional testing including deficiencies discovered.
   6. Systems manual: Commissioning authority shall compile the systems manual using submittal data provided by the general contractor and applicable subcontractors.
   7. Final commissioning report: Commissioning authority shall issue final commissioning report documenting the entire process and final results of functional testing. Report shall include final testing and balancing report.

B. Electrical System Equipment to be tested
   1. Occupancy sensors.
   2. Time switch controls
   3. Daylighting controls.
   4. Electrical Service and Distribution System.

C. Testing functions and conditions
   1. Daylighting control devices
      a. Verify the devices have been calibrated, properly located and adjusted.
      b. Loads adjust to light level set points in response to daylight.
      c. Location of calibration equipment is accessible to authorized personnel only.
   2. Time switches
      a. Verify schedule, time, date and programming is accurate.
      b. Verify override time limit is set, battery is installed and switch operates the lights that are specified in the design documents.
      c. All specified lights can be turned on and off by area control switch.
      d. Manual override switch allows only the lights in the space where the switch is located turn on or remain on until next scheduled shut off.
   3. Occupant sensors:

a. Certify the sensor has been located and aimed in accordance with manufacturer recommendations.
b. For projects with fewer than seven sensors, each sensor shall be tested.
c. Fore projects with more than seven occupant sensors, testing shall be done for each unique combination of sensor type and space geometry. Where multiples of each combination are provided not less than 10 percent shall be tested.
d. Verify correct operation of status indicators.
e. Controlled lights turn off or down to the permitted level with in the required time.
f. For auto-on sensor, the lights turn-on to the permitted level when an occupant enters space.
g. Verify the lights are not incorrectly turned-on by movement in adjacent areas or by HVAC operation.

D. Performance criteria
1. Daylighting controls shall maintain specified light levels within 5% of design.
2. All time switches shall be accurate to time on cellular network devices.

PART 2 - PRODUCTS

2.1 NO PRODUCTS SUPPLIED

PART 3 - EXECUTION

3.1 GENERAL

A. This Division has startup responsibilities and are required to complete sub-systems so COMPLETE SYSTEMS are fully functional. Insuring they meet design requirements of Contract Documents. Commissioning procedures and testing do not relieve or lessen this responsibility or shift this responsibility, in whole or in part, to Commissioning Agent or Owner.

B. Coordinate with other Sub-Contractors and equipment vendors to set aside adequate time to address Pre-Functional Checklists, Functional Performance Tests, Operations & Maintenance Manual creation, Owner Training, and associated coordination meetings.

C. Commissioning authority will also conduct site inspections at critical times and issue Cx Field Reports with observations on installation deficiencies so that they may be issued by Architect as deemed appropriate.

3.2 WORK PRIOR TO COMMISSIONING

A. Complete all phases of the work so the systems can be started, adjusted, balanced and otherwise tested.

B. See pertinent specification sections in this Division, which outline responsibilities for start-up of equipment with obligations to complete systems, including all sub-systems so that they are fully functional.

C. Assist Commissioning Agent with all information pertaining to actual equipment and installation as required complete the full commissioning scope.

D. Contractor shall prepare startup procedures to demonstrate compliance with pre-functional checklists, and coordinate scheduling for completion of these checklists.

E. A minimum of seven (7) days prior to date of system startup, submit to Commissioning Agent for review, detailed description of equipment start-up procedures which contractor proposes to perform to demonstrate conformance of systems to specifications and Checklists.

3.3 PARTICIPATION IN COMMISSIONING

A. Attend meetings related to the Commissioning Process; arrange for attendance by personnel and vendors directly involved in the project, prior to testing of their systems.

B. Provide skilled technicians to startup and test all systems, and place systems in complete and fully functioning service in accordance with Contract Documents.

C. Provide skilled technicians, experienced and familiar with systems being commissioned, to assist Commissioning authority in commissioning process.

3.4 WORK TO RESOLVE DEFICIENCIES

A. Complete corrective work in a timely manner to allow expeditious completion of Commissioning Process. If deadlines pass without resolution of identified problems, Owner reserves the right to obtain supplementary services and/or equipment to resolve the problem. Costs thus incurred will be Contractor's responsibility.

3.5 PRE-FUNCTIONAL CHECKLISTS (PFC)

A. Contractor shall complete Pre-Functional Checklists to validate compliance with Contract Documents installation and start-up requirements, for this Division's systems.

B. Refer to commissioning plan for detailed list of equipment to be commissioned.

3.6 FUNCTIONAL PERFORMANCE TESTING (FPT)

A. Contractor, in cooperation with Commissioning Agent, shall conduct Functional Performance Testing to validate compliance with Contract Documents.

B. Refer to commissioning plan for detailed list of equipment to be commissioned.

C. Provide commissioning authority with a certificate of readiness to show systems are ready to schedule functional testing.

D. Assist Commissioning authority in Functional Testing by removing equipment covers, opening access panels, etc. Furnish ladders, flashlights, meters, gauges, or other inspection equipment as necessary.

E. Sampling
   1. Multiple identical pieces of non-life-safety or otherwise non-critical equipment may be functionally tested using a sampling strategy.
   2. Significant application differences and significant sequence of operation differences in otherwise identical equipment invalidates their common identity. A small size or capacity difference, alone, does not constitute a difference. It is noted that no sampling by Subs is allowed in pre-functional checklist execution.

3. A common sampling strategy is the “xx% Sampling - yy% Failure Rule”, defined by the following example.
    a. xx = the percent of the group of identical equipment to be included in each sample.
    b. yy = the percent of the sample that if failing, will require another sample to be tested.
    c. The example below describes a 20% Sampling - 10% Failure Rule.
    d. Randomly test at least 20% (xx) of each group of identical equipment. In no case test less than three units in each group. This 20%, or three, constitute the “first sample.”
    e. If 10% (yy) of the units in the first sample fail the functional tests, test another 20% of the group (the second sample).
    f. If 10% of the units in the second sample fail, test all remaining units in the whole group.
    g. If at any point, frequent failures are occurring and testing is becoming more troubleshooting than verification, the CxA may stop the testing and require the responsible Sub to perform and document a checkout of the remaining units, prior to continuing with functionally testing the remaining units.

F. Re-Testing And Failure To Remedy Deficiencies
1. Despite Contractor’s best efforts to ensure systems are problem-free, it is expected that some deficiencies will be found during initial inspection of Pre-functional Checklist, and during initial Functional Testing; such deficiencies are expected to be minimal.
2. It is Contractor’s responsibility to remedy identified deficiencies, both in Pre-functional Checklist and in Functional Testing phases of work, in a timely and thorough manner.
3. It is Contractor’s responsibility to ensure that all deficiencies are corrected prior to requesting a re-inspection or re-test of systems and equipment. Do not request re-inspection or re-test until deficiencies are corrected.
    a. At his discretion, CxA may agree to re-testing systems or equipment where deficiencies remain which are beyond Contractor’s control to resolve expeditiously.
    b. Typically such re-testing of incomplete systems and equipment will take place only if remaining deficiencies are minor in scope and nature, and are of such nature that they cannot be resolved in a timely manner (such as those due to difficulties in obtaining parts, or where Owner has requested a change that has delayed work, etc.)
4. CxA will carry out a second re-inspection or re-test of systems and equipment subsequent to receiving Contractor’s request.
    a. If CxA finds deficiencies identified in initial inspection or test have not been remedied (with exception of un-resolvable deficiencies in 3.b. above), and such remaining deficiencies are significant enough to require additional inspection or re-testing, Contractor will be back-charged for CxA’s expenses, and time at a rate of $150.00 per hour and $100.00 expenses, for a third and any subsequent re-inspections and re-tests.

G. Deferred Testing
1. "Seasonal Commissioning” pertains to testing during peak heating or cooling seasons when HVAC equipment is operating at full-load or heavy-load conditions. Initial commissioning will be done as soon as contract work is completed, regardless of season. Seasonal Commissioning under full- or heavy-load conditions other than the current season will be handled at later time by GC and CxA.
2. If adequate load may be artificially placed upon heating or cooling equipment, CxA, at his discretion, may perform functional testing during non-peak load periods.
3. GC is to provide services of personnel and participate in seasonal testing process in the same manner as he would in non-seasonal testing.
4. Until off-season commissioning can be accomplished, Owner may retain an amount from GC’s payment sufficient to cover the cost of off-season testing.

5. Unforeseen Deferred Tests: If any check or test cannot be completed due to building structure, required occupancy condition, or other reason, execution of checklists and functional testing may be delayed upon approval of Owner. Tests shall be conducted in same manner as seasonal tests, as soon as possible. Services of required parties will be negotiated. Make final adjustments to Operation and Maintenance Manuals and record drawings due to unforeseen deferred tests.
6. GC is to provide services of personnel and participate in deferred testing in the same manner as he would for normal commissioning.

3.7 TRAINING

A. The following requirements are in addition to Operations & Maintenance requirements specified elsewhere in this specifications manual.

B. Contractor shall be responsible for training coordination and scheduling, and ultimately to ensure that training is completed.

C. The training agenda (plan) shall include, at a minimum, the following elements:
1. Purpose of equipment.
2. Principle of how the equipment works.
3. Important parts and assemblies.
4. How the equipment achieves its purpose and necessary operating conditions.
5. Most likely failure modes, causes and corrections.
6. On site demonstration.

D. Commissioning Agent shall be responsible for overseeing and approving content and adequacy of training of Owner personnel for all installed systems. Provide Commissioning Agent with training plan two weeks before planned training.

3.8 OPERATIONS & MAINTENANCE MANUALS

A. The following requirements are in addition to Operations & Maintenance requirements specified elsewhere in this specifications manual.

B. Contractor shall compile and prepare documentation for equipment and systems specified in this Division, and shall deliver documentation to Contractor for inclusion in Operation & Maintenance Manuals, in accordance with requirements of Division 01, prior to training Owner personnel.

C. Provide Commissioning authority with a single, electronic copy of Operation & Maintenance Manuals for review. Commissioning authority’s copy of O&M manuals shall be submitted through Architect.

D. Operation and maintenance manuals shall include, service agency contact information, maintenance requirements, controls system settings and a narrative of how each system is intended to operate, including set points.

3.9 DOCUMENTATION

A. Commissioning authority shall provide documentation of process as follows:

1. Preliminary commissioning report including test procedures, results of testing, itemization of deficiencies, deferred tests and climatic conditions required for performance of deferred tests. Preliminary commissioning report shall be issued to owner to demonstrate the first pass of testing has occurred and to demonstrate compliance with applicable codes.
2. Final commissioning report shall include the final test and balance report, final results of functional testing, disposition of deficiencies discovered during testing, including the details of corrective measures used and functional testing procedures used for repeatability of testing in the future.

END OF SECTION 26 08 00

SECTION 26 09 43 - NETWORK LIGHTING CONTROLS

PART 1 - GENERAL

1.1 SCOPE

A. Electrical contractor shall provide and install a complete networked lighting control system that controls all interior and exterior lighting fixtures, including emergency fixtures. All lighting fixtures shall be controllable from the district energy management office. It is the contractor's responsibility to provide and install a complete and functional system, including, but not limited to all room controllers, occupancy sensors, low voltage control stations, emergency bypass controllers, and network bridges, low voltage control cable and lighting network equipment, even if not specifically called out on the plans.

B. The locations and quantities of sensors shown on the drawings are diagrammatic and indication only rooms that are to be provided with sensors and controls. Provide additional devices if required to properly and completely cover the respective room. Ensure the best possible installation in teh available space and to overcome local difficulties due to space limitations or interefence of structural components.

C. Wireless devices are not allowed, Batteries are prohibited. No Exceptions with Dallas ISD written approval.

D. System shall be comprised of it's own network for lighting and lighting controls, but shall be capable of communicating and future interface with Building Automation Control systems

1.2 SUMMARY

A. Section Includes:
   1. Digital Occupancy and Daylighting Sensor Control
   2. Emergency Lighting Control

B. Related Section
   1. Section 26 27 26 - Wiring Devices: Receptacles
   2. Drawings and general provision of the Contact, including General and Supplementary Conditions and Division 01 Specification Sections apply to this Section
   3. Electrical Sections, including wiring devices, apply to the work of this Section.

C. Control Intent - Control Intent includes, but is not limited to:
   1. Defaults and initial calibration settings for such items as time delay, sensitivity, fade rates, etc.
   2. Initial sensor and switching zones
   3. Initial time switch settings
   4. Task lighting and receptacle controls
   5. Emergency Lighting control

1.3 REFERENCES

A. American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE)

B. Underwriter Laboratories of Canada (ULC)

C. International Electrotechnical Commission

D. International Organization for Standardization (ISO)

E. National Electrical Manufacturers Association (NEMA)

F. WD1 (R2005) - General Color Requirements for Wiring Devices.

G. Underwriters Laboratories, Inc. (UL)
   1. 916 - Energy Management Equipment.
   2. 924 - Emergency Lighting

1.4 SYSTEM DESCRIPTION & OPERATION

A. The Lighting Control and Automation system as defined under this section covers the following equipment:
   1. Digital Room Controllers - Self-configuring, digitally addressable one, two or three relays controllers with integral current thyristor, 0-10 volt control for ballasts (if applicable).
   2. Digital Occupancy Sensors - Self-configuring, digitally addressable and calibrated occupancy sensors with LCD display and two-way active infrared (IR) communications.
   3. Digital Switches - Self-configuring, digitally addressable pushbutton switches, dimmers, and scene switches with two-way active infrared (IR) communications.
   4. Digital Photosensors - Single-zone closed loop and multi-zone open loop daylighting sensors with two-way active infrared (IR) communications can provide switching or dimming control for daylight harvesting.
   5. Configuration Tools - Handheld remote for room configuration provides two way infrared (IR) communications to digital devices and allows complete configuration and reconfiguration of the device / room from up to 30 feet away. Unit to have Organic LED display, simple pushbutton interface, and allow send and receive of room variables and store of occupancy sensor settings. Computer software also customizes room settings.
   6. Handheld remotes for personal control - One-button dimming, two-button on/off, or five-button scene remotes provide control using infrared communications. Remote may be configured in the field to control selected loads or scenes without special tools.
   7. Network Lighting local network - Free topology, plug-in wiring system (Cat 5e) for power and data to room devices.
   8. Network Bridge - provides BACnet MS/TP-compliant digital networked communication between rooms, panels and the Segment Manager or building automation system (BAS).
   9. Segment Manager - provides web browser-based user interface for system control, scheduling, power monitoring, room device parameter administration and reporting.
   10. Emergency Lighting Control Unit (ELCU) - allows a standard lighting control device to control emergency lighting in conjunction with normal lighting in any area within a building

1.5 SUBMITTALS

A. Submittals Package: Submit the shop drawings, and the product data specified below at the same time as a package.

B. Shop Drawings:

1. Composite wiring and/or schematic diagram of each control circuit as proposed to be installed (standard diagrams will not be accepted).
2. Scale drawing for each area showing exact location of each sensor, room controller, and digital switch.

C. Product Data: Catalog sheets, specifications and installation instructions.

D. Include data for each device which:
1. Indicates where sensor is proposed to be installed.
2. Prove that the sensor is suitable for the proposed application.

1.6 QUALITY ASSURANCE

A. Manufacturer: Minimum 5 Years experience in manufacture of lighting controls.

1.7 PROJECT CONDITIONS

A. Do not install equipment until following conditions can be maintained in spaces to receive equipment:
1. Ambient temperature: 0° to 40° C (32° to 104° F).
2. Relative humidity: Maximum 90 percent, non-condensing.

1.8 WARRANTY

A. Provide a five year complete manufacturer's warranty on all products to be free of manufacturers' defects.

1.9 MAINTENANCE

A. Spare Parts:
1. Provide 1 spare gateway. Provide 5 spares of each product listed below to be used for maintenance. Electrical contractor deliver items to maintenance department within 30 days of substantial completion.
    a. Room Controllers
    b. Occupancy Sensors
    c. Emergency Bypass controllers
    d. Low voltage switches
    e. Daylighting harvesting photocells

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Douglas

B. nLight
1. and compatible Acuity Brands System

2.2 WALL SWITCH OCCUPANCY SENSORS

A. Manual-ON, Automatic-OFF dual technology (passive infrared and ultrasonic) wall switch occupancy sensor Furnish the Company's model which suits the electrical system parameters, and accommodates the square-foot coverage and wattage requirement for each area (and type of lighting) controlled

B. Shall have masking or integral shielding to control coverage area. stickers or external adhesives are not acceptable.

2.3 DIGITAL WALL OR CEILING MOUNTED OCCUPANCY SENSOR SYSTEM

A. Ceiling mounted dual technology digital (passive infrared and ultrasonic) occupancy sensor. Furnish the Company's system which accommodates the square-foot coverage requirements for each area controlled, utilizing room controllers, digital occupancy sensors and accessories which suit the lighting and electrical system parameters.

B. Digital Occupancy Sensors shall provide graphic LCD display for digital calibration and electronic documentation. Features include the following:
   1. Digital calibration and pushbutton programming for the following variables:
      a. Sensitivity - 0-100% in 10% increments
      b. Time delay - 1-30 minutes in 1 minute increments
      c. Test mode - Five second time delay
      d. Detection technology - Dual Technology activation and/or re-activation.
      e. Walk-through mode
      f. Load parameters including Auto/Manual-ON, blink warning, and daylight enable/disable when photosensors are included in the Lighting local network.
   2. One or two RJ-45 port(s) for connection to Lighting local network.
   3. Device Status LEDs including:
      a. PIR Detection
      b. Ultrasonic detection
      c. Configuration mode
      d. Load binding
   4. Assignment of occupancy sensor to a specific load within the room without wiring or special tools.
   5. Manual override of controlled loads.

C. Multiple occupancy sensors may be installed in a room by simply connecting them to the free topology lighting local network. No additional configuration will be required.

D. Shall have masking or integral shielding to control coverage area. stickers or external adhesives are not acceptable.

2.4 DIGITAL WALL SWITCHES

A. Low voltage momentary pushbutton switches in 1, 2, 3, 4, 5 and 8 button configuration; available in white, light almond, ivory, grey and black; compatible with wall plates with decorator opening. Wall switches shall include the following features:
   1. Two-way infrared (IR) transceiver for use with personal and configuration remote controls.
   2. Removable buttons for field replacement with engraved buttons and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall.

3. Red configuration LED on each switch that blinks to indicate data transmission.
4. Scene Status LED on each switch button with the following characteristics:
    a. Bi-level LED
    b. Dim locator level indicates power to switch
    c. Bright status level indicates that load or scene is active

B. Two RJ-45 ports for connection to lighting local network.

C. Multiple digital wall switches may be installed in a room by simply connecting them to the free topology Lighting local network. No additional configuration will be required to achieve multi-way switching.

D. The following switch attributes may be changed or selected using a wireless configuration tool:
1. Load and Scene button function may be reconfigured for individual buttons (from Load to Scene, and vice versa).
2. Individual button function may be configured to Toggle, On only or Off only.
3. Individual scenes may be locked to prevent unauthorized change.
4. Fade Up and Fade Down times for individual scenes
5. Ramp rate may be adjusted for each dimmer switch.
6. Switch buttons may be bound to any load on a room controller and are not load type dependent; each button may be bound to multiple loads.

E. Shall have masking or integral shielding to control coverage area. stickers or external adhesives are not acceptable.

2.5 ROOM CONTROLLERS

A. Room Controllers automatically bind the room loads to the connected devices in the space without commissioning or the use of any tools. Room Controllers shall be provided to match the room lighting load and control requirements. The controllers will be simple to install and will not have, dip switches, potentiometers or require special configuration. The control units will include the following features:
1. Automatic room configuration to the most energy-efficient sequence of operation based upon the devices in the room.
2. Simple replacement - Using the default automatic configuration capabilities, a room controller may be replaced with an off-the-shelf unit without requiring any configuration or setup.
3. Device Status LEDs to indicate:
    a. Data transmission
    b. Device has power
    c. Status for each load
    d. Configuration status
4. Quick installation features including:
    a. Standard junction box mounting
    b. Quick low voltage connections using standard RJ-45 patch cable
5. Plenum rated
6. Manual override and LED indication for each load
7. Dual voltage (120/277 VAC, 60 Hz)
8. Zero cross circuitry for each load.

B. On/Off/Dimming enhanced Room Controllers shall include:

1. Real time current monitoring
2. One, two or three relay configuration
3. Efficient 250 mA switching power supply
4. Four RJ-45 Lighting local network ports.
5. One 0-10 volt analog output per relay for control of compatible ballasts and LED drivers.
6. The following dimming attributes may be changed or selected using a wireless configuration tool:
    a. Establish preset level for each load from 0-100%
    b. Set high and low trim for each load
    c. Set lamp burn in time for each load up to 100 hours
7. Discrete model listed for connection to receptacles, for occupancy-based control of plug loads within the space.
    a. One relay configuration only
    b. Automatic-ON/OFF configuration

2.6 DIGITAL PHOTOSENSORS

A. Digital photosensors work with room controllers to provide automatic switching or dimming daylight harvesting capabilities for any load type connected to a room controller. Closed loop photosensors measure the ambient light in the space and control a single lighting zone. Open loop photosensors measure incoming daylight in the space, and are capable of controlling up to three lighting zones. Photosensors shall be interchangeable without the need for rewiring.

B. Digital photosensors include the following features:
1. An internal photodiode that measures only within the visible spectrum, and has a response curve that closely matches the photopic curve. The photodiode shall not measure energy in either the ultraviolet or infrared spectrums. The photocell shall have a sensitivity of less than 5% for any wavelengths less than 400 nanometers or greater than 700 nanometers.
2. Sensor light level range shall be from 1-10,000 footcandles (fc).
3. The capability of switching one-third, one-half or all lighting ON and OFF, or raising or lowering lighting levels, for each controlled zone, depending on the selection of room controller(s) and load binding to room controller(s).
4. For switching daylight harvesting, the photosensor shall provide a deadband or a separation between the “ON Setpoint” and the “OFF Setpoint” that will prevent the lights from cycling after they turn off.
5. For dimming daylight harvesting, the photosensor shall provide the option, when the daylight contribution is sufficient, of turning lights off or dimming lights to a user-selectable minimum level.
6. Optional programmable wall switch override to allow occupants to reduce lighting level to increase energy savings or, if permitted by system administrator, raise and lower lighting levels for a selected period of time or cycle of occupancy.
7. Infrared (IR) transceiver for configuration and/or commissioning with a handheld configuration tool, to transmit detected light level to wireless configuration tool, and for communication with personal remote controls.
8. Red configuration LED that blinks to indicate data transmission.
9. Blue status LED indicates test mode, override mode and load binding.
10. Recessed switch to turn controlled load(s) ON and OFF.
11. One RJ-45 port for connection to Lighting local network.

12. An adjustable head and a mounting bracket to accommodate multiple mounting methods and building materials. The photosensor may be mounted on a ceiling tile, skylight light well, suspended lighting fixture or backbox.

C. Closed loop digital photosensors include the following additional features:
   1. An internal photodiode that measures light in a 100 degree angle, cutting off the unwanted light from bright sources outside of this cone.
   2. Automatic self-calibration, initiated from the photosensor, a wireless configuration tool or a PC with appropriate software.
   3. Automatically establishes setpoints following self-calibration.
   4. A sliding setpoint control algorithm for dimming daylight harvesting with a “Day Setpoint” and the “Night Setpoint” to prevent the lights from cycling.

D. Open loop digital photosensors include the following additional features:
   1. An internal photodiode that measures light in a 60 degree angle cutting off the unwanted light from the interior of the room.
   2. Automatically establishes setpoints following calibration using a wireless configuration tool or a PC with appropriate software.
   3. A proportional control algorithm for dimming daylight harvesting with a “Setpoint” to be maintained during operation.

E. Shall include integral masking or shielding to control coverage area. stickers and other external adhesives are not acceptable.

2.7 EMERGENCY LIGHTING

A. Emergency Lighting Control Unit - A UL 924 listed device that monitors a switched circuit providing normal lighting to an area. The unit provides normal ON/OFF control of emergency lighting along with the normal lighting. Upon normal power failure the emergency lighting circuit will close, forcing the emergency lighting ON until normal power is restored. Features include:
   1. 120/277 volts, 50/60 Hz., 20 amp ballast rating
   2. Push to test button
   3. Auxiliary contact for remote test.

2.8 LIGHTING LOCAL NETWORK

A. The Lighting local network is a free topology lighting control physical connection and communication protocol designed to control a small area of a building. Digital room devices connect to the network using CAT 5e cables with RJ-45 connectors which provide both data and power to room devices. Features of the Lighting local network include:
   1. Plug & Play automatic configuration and binding of occupancy sensors, switches and lighting loads to the most energy-efficient sequence of operation based upon the device attached.
   2. Simple replacement of any device in the network with a standard off the shelf unit without requiring commissioning, configuration or setup.
   3. Push n’ Learn configuration to change the automatic configuration, including binding and load parameters without tools, using only the buttons on the digital devices in the local network.
   4. Two-way infrared communications for control by handheld remotes, and configuration by a handheld tool including adjusting load parameters, sensor configuration and binding, within a line of sight of up to 30 feet from a sensor, wall switch or IR receiver.

2.9 BACNET BASED DIGITAL COMMUNICATIONS

A. The lighting control panel shall support digital communications to facilitate the extension of control to include interoperation with building automation systems and other intelligent field devices. Digital communications shall be RS485 master/slave token passing-based using the BACnet® protocol.

B. The panel shall have provision for an individual BACnet device ID. The device ID description property shall be writable via the network to allow unique identification of the lighting control panel on the network.

C. The panel shall support MS/TP MAC addresses in the range of 0 - 127 and baud rates of 9600k, 38400k, 76800k, and 115.2k bits per second.

D. Lighting control relays shall be controllable as binary output objects in the instance range of 1 - 64. The state of each relay shall be readable and writable by the BAS via the object present value property

E. Lighting control relays shall report their true on/off state as binary input objects in the instance range of 1 - 64.

F. The 99 channel groups associated with the panel shall be represented by binary value objects in the instance range of 201 - 299. The occupancy state of each channel group shall be readable and writable by the BAS via the object present value property. Commanding 1 to a channel group will put all relays associated with the channel into the normal hours mode. Commanding 0 or NULL shall put the relays into the after hours mode.

G. Setup and commissioning of the panel shall not require manufacturer-specific software or a computer. All configuration of the lighting control panel shall be performed using standard BACnet objects or via the handheld IR programming remote.

H. The description property for all objects shall be writable via the network and shall be saved in non-volatile memory within the panel.

I. Lockout of all digital switch buttons connected to a given panel shall be command-able via a single object.

2.10 USER INTERFACE

A. Each lighting control panel system shall be supplied with at least (1) handheld IR remote programming interface consisting of a keypad and associated OLED display screen. The user interface shall allow setup, configuration, and diagnostics of the panel without the need for software or connection of a computer. The user interface shall have the following functions as a minimum:

B. Set network parameters including panel device ID, MS/TP MAC address, baud rate and max master range.

C. Relay Group creation of up to 99 groups. Group creation shall result in programming of all seven key relay parameters for member relays. The seven parameters are as follows: After-hours Override Time Delay, Normal Hours Override Time Delay, Action on Transition to Normal Hours, Action on Transition to After Hours, Sensor Action During Normal Hours, Sensor Action During After Hours, Blink-Warn Time for After Hours.

D. Program up to 254 separate scheduled events. Events shall occur on seven (7) day intervals with each day selectable as active or inactive, and shall be configurable as to whether the event is active on holidays. Holidays are also defined through the User Interface.

E. Program up to 32 separate Dark/Light events. Events shall have a selectable source as either calculated Astro with delay, or a digital IO module with an integral 0-5V or 0-10V analog photocell. Dark/Light events shall occur on seven (7) day intervals with each day selectable as active or inactive, and shall be configurable as to whether the event is active on holidays.

F. Button binding of digital switches to groups shall be accessible via the handheld IR remote and accomplished from the digital switch station.

G. Programming of panel location information shall be accomplished by the handheld IR remote and include at a minimum LAT, LON, DST zone, and an approximate city/state location.

H. An additional handheld IR remote may optionally be specified to be permanently mounted to the panel interior via a retractable anti-theft lanyard to allow for convenient programming of the panel while assuring that the handheld programmer is always present at that panel. An unlimited number of handheld IR remotes may also be purchased for facilities staff as seen fit by the end user's representative.

2.11 CONFIGURATIONS TOOLS

A. A configuration tool facilitates optional customization of Lighting local networks and is used to setup open loop daylighting sensors. A wireless configuration tool features infrared communications, while PC software connects to each local network via a USB interface.

B. Features and functionality of the wireless configuration tool shall include:
   1. Two-way infrared (IR) communication with Lighting IR-enabled devices within a range of approximately 30 feet.
   2. High visibility organic LED (OLED) display, pushbutton user interface and menu- driven operation.
   3. Read, modify and send parameters for occupancy sensors, daylighting sensors, room controllers and buttons on digital wall switches.
   4. Save up to nine occupancy sensor setting profiles, and apply profiles to selected sensors.
   5. Temporarily adjust light level of any load(s)on the local network, and incorporate those levels in scene setting.
   6. Adjust or fine-tune daylighting settings established during auto-commissioning, and input light level data to complete commissioning of open loop daylighting controls.

2.12 NETWORK BRIDGE

A. The network bridge connects a Lighting local network to a BACnet-compliant network for communication between rooms, panels and a segment manager or BAS. Each local network shall include a network bridge component to provide a connection to the local network room devices. The network bridge shall use industry standard BACnet MS/TP network communication. Closed or proprietary network communication shall not be acceptable.
   1. The network bridge may be incorporated directly into the room controller hardware or be provided as a separate module connected on the local network through an available RJ-45 port.
   2. Provide Plug & Play operation to automatically discover all room devices connected to the local network and make all device parameters visible to the segment manager via the segment network. No commissioning shall be required for set up of the network bridge on the local network.
   3. The network bridge shall automatically create standard BACnet objects for selected room device parameters to allow any BACnet-compliant BAS to include lighting control and power monitoring features as provided by the Lighting room devices on each local network. Standard BACnet objects shall be provided as follows:
      a. Read/write the normal or after-hours schedule state for the room
      b. Read the detection state of the occupancy sensor
      c. Read/write the On/Off state of loads
      d. Read/write the dimmed light level of loads
      e. Read the button states of switches
      f. Read total current in amps, and total power in watts through the room controller
      g. Read/write occupancy sensor time delay, PIR sensitivity and ultrasonic sensitivity settings
      h. Activate a preset scene for the room
      i. Read/write daylight sensor fade time and say and night setpoints
      j. Read the current light level, in footcandles, from interior and exterior photosensors and photocells
      k. Set daylight sensor operating mode
      l. Read/write wall switch lock status

2.13 SEGMENT MANAGER

A. The Network Lighting system shall include at least one segment manager to manage network communication. It shall serve up a graphical user interface via a standard web browser. Each segment manager shall have support for one, two or three segment networks as required and allow for control of a maximum of 40 local networks (rooms) and/or lighting control panels per segment network.

B. Operational features of the Segment Manager shall include the following:
   1. Connection to PC or LAN via standard Ethernet TCP/IP.
   2. Easy to learn and use graphical user interface, compatible with Internet Explorer 8, or equal browser.
   3. Log in security capable of restricting some users to view-only or other limited operations.
   4. Automatic discovery of all control devices on the segment network(s). Commissioning beyond activation of the discovery function shall not be required.
   5. After discovery, all rooms and panels shall be presented in a standard navigation tree format. Selecting a device from the tree will allow the device settings and operational parameters to be viewed and changed by the user.

6. Ability to view and modify room device operational parameters. It shall be possible to set device parameters independently for normal hours and after hours operation.
7. Ability to set up schedules for rooms and panels. Schedules shall automatically set controlled zones or areas to either a normal hours or after hours mode of operation.
8. Ability to group rooms and loads for common control by schedules, switches or network commands.
9. Ability to monitor connected load current and display power consumption for areas equipped with room controllers incorporating the integral current monitoring feature.
10. Provide seamless integration with the BAS via BACnet IP. Provide export table with available parameters.

2.14 REALTIME COLOR GRAPHICS

A. System Description
   1. Color graphics screens shall allow a user to monitor and control the lighting control system through a graphical color interface. The system will control the room controllers in a real-time environment.
   2. The application will provide a visual representation of the floor plan, drawn to scale, with each fixture displayed on screen. Fixtures can automatically indicate the relay controlling them on screen.

B. Graphic Screen Generation
   1. The General Contractor shall provide as built CAD floor plans to the manufacturer for generation of graphic screens.
   2. As-Built relay panel and reflected ceiling documentation must be provided to the manufacturer before graphic screen development can begin. Graphic screens will be provided and demonstrated to the owner within 90 days of receiving as built CAD files.
   3. District Wide Home Screen
      a. Links to all existing WattStopper Schools in the district
   4. School Home screen
      a. School Rendering
      b. Day/ Time
      c. Schedule for that day
      d. Exterior FC reading
      e. Current Lighting Watts per sq.ft.
   5. Quick Access System tree
      a. Links
      b. 365 day Scheduler
   6. Site Plan
      a. All exterior lighting shown on/ off
   7. Screens per floor
      a. For navigation and showing lighting on/off
   8. Detail screen per architectural area
      a. Room Occupancy (room shaded green)
      b. Lighting states (3 zones with override)
      c. Real time wattage for lighting
      d. Real Time Wattage for plug load
      e. Real time Photocell footcandle reading if applicable
   9. Alarms Reports

PART 3 - EXECUTION

3.1 INSTALLATION

A. Contractor shall provide to the manufacturer all quantities for system including but not limited to relays, room controllers, relay panels, plug load controllers, switches, sensors and wire lengths and configurations for both network and device cable at least 1 week before bid.

B. When using wire for connections other than the lighting local network (Cat 5e with RJ-45 connectors), provide detailed point to point wiring diagrams for every termination. Provide wire specifications and wire colors to simplify contactor termination requirements

C. All MSTP network and Cat 5e low voltage wiring must have “Lighting Controls” printed on the wire jacket. Any cable substitutions shall be removed and replaced at the contractor’s expense.

D. All MSTP network terminations shall utilize wire ferrules for terminations and MSTP network manufacturer’s instructions. Any network deficiencies shall be repaired at the contractor’s expense.

E. Electrical contractor must provide a detailed as-built plan in CAD showing MSTP network cable routing and network bridge serial numbers to the manufacturer at least 2 weeks prior to factory commissioning Install the work of this Section in accordance with manufacturer’s printed instructions unless otherwise indicated.

F. All Power packs, relay packs, room controllers, or similar devices typcically located above ceilign shall be located directly above the control device nearest the mainline communications backbone for the lighting control system. For Example, if a space has 2 entrance doors and each has a lighting control device adjacent (scene controller or common switch) the control devices shall be located above the switches nearest the pathway of the backbone network cabling.

3.2 FACTORY COMMISSIONING

A. Upon completion of the installation, the system shall be commissioned by the manufacturer's factory authorized representative who will verify a complete fully functional system.

B. The factory commissioning shall include the following services. Programming of all button stations, configuration of all occupancy sensors and photocells. Verification of a complete and working system including MSTP network status. Provide written or computer-generated documentation on the commissioning of the system including room by room description including:
   1. Sensor parameters, time delays, sensitivities, and daylighting setpoints.
   2. Sequence of operation, (e.g. manual ON, Auto OFF. etc.)
   3. Load Parameters (e.g. blink warning, etc.)

C. The electrical contractor shall request factory commissioning by submitting a startup request form at least (4) weeks before startup is required.

D. The electrical contractor shall provide at least (1) journeyman electrician, familiar with the installation of the system, dedicated to assisting the factory start-up technician for the entire duration of the commissioning process.

E. Upon completion of the system commissioning the factory-authorized technician shall provide the proper training to the owner's personnel on the adjustment and maintenance of the system.

F. Provide a training session for the owner's operations personnel. Training session shall be performed by a qualified person who is knowledgeable in the subject/equipment. Submit a training agenda two (2) weeks prior to the proposed training session for review and approval. Training session shall include at the minimum:
   1. Purpose of equipment.
   2. Principle of how the equipment works.
   3. Important parts and assemblies.
   4. How the equipment achieves its purpose and necessary operating conditions.
   5. Most likely failure modes, causes and corrections.
   6. On site demonstration.

3.3 RE-COMMISSIONING

A. After 90 days from occupancy the factory authorized representative and electrical contractor shall re-calibrate all sensor time delays and sensitivities to meet the Owner's Project Requirements. Provide a detailed report to the Architect / Owner of re-commissioning activity

END OF SECTION 26 09 43

SECTION 26 22 22 - LOW VOLTAGE HARMONIC MITIGATING DISTRIBUTION TRANSFORMERS

PART 1 - GENERAL

1.1 SCOPE

A. Provide 480 - 208Y/120 volt 3 phase, 4 wire transformers as shown, scheduled and as specified.

B. The type of transformers required are dry-type harmonic mitigating transformers.

1.2 STANDARDS

A. Products shall be designed, manufactured, tested and installed in compliance with applicable ANSI/IEE and NEMA standards.
   1. All low voltage transformers shall be UL listed and labeled.
   2. All low voltage transformers 15 kVA and larger shall meet or exceed post-January 1, 2016 U.S. DOE efficiency requirements Energy, 10 C.F.R. §431.196(a)(2) (2015) regardless of whether transformer date of manufacture is pre or post January 1, 2016.
   3. All low voltage transformers 15 kVA and larger shall be tested for efficiency in accordance with U.S. DOE test methods Energy, 10 C.F.R. §431, Subpart K, Appendix A (2015).

1.3 ACCEPTABLE MANUFACTURERS

A. Power Quality International, Inc. (PQI)

1.4 SUBMITTALS

A. Shop drawings shall include, but not be limited to:
   1. Cutsheets of transformers with sound and load ratings, dimensions, weights, impedance rating, insulation type, temperature rise, phase displacement and tap configurations.

1.5 REQUIREMENTS OF REGULATORY AGENCIES

A. National Electrical Code.

B. Local, municipal, and/or state codes that have jurisdiction.

1.6 DESIGN OBJECTIVES

A. The design of the electrical distribution system, as described by this specification and detailed in the accompanying electrical drawings, provides for control of the harmonic currents that are generated by non-linear electronic loads. These design objectives, and the various standards that apply, are detailed herein as follows:
   1. To reduce the ‘penalty losses’ that are produced by harmonic currents, which would otherwise result in an increase in the cost-of-power, apparatus heating and the cost of air-conditioning, within economic limits.
   2. To limit harmonic current injection into the Point of Common Coupling (PCC), as required in IEEE 519 , Section 10.4, Table 10.3.

3. To limit positive, negative and zero sequence harmonic currents in the distribution system so that the Individual Harmonic Distortion of Voltage (IHDv) levels do not exceed 3% at the loads and the Total Harmonic Distortion of Voltage (THDv) levels do not exceed 5% at the loads, as recommended in IEEE 519, Section 6.6, Paragraph 2.
4. To limit zero sequence harmonic currents in the neutral conductors so that their ratings are not exceeded and Common Mode Noise (CMN) neutral-ground voltage levels do not exceed 5 volts at the loads, as recommended by CBEMA. Where computers and/or audio/visual devices are interconnected into a communications 'network', to limit the difference in CMN to < 2 volts at all loads, as recommended by EPRI.

1.7 FACTORY TESTING

A. The manufacturer shall provide linear and non-linear efficiency test on each transformer. Transformers not meeting the following criteria will not be used on this job. The data shall be included in the Operations and Maintenance Manuals. The tests shall be conducted between 0% and 100% full load and shall be plotted for each transformer.
   1. Linear Load Efficiency: Transformer shall meet or exceed post-January 1, 2016 U.S. DOE efficiency requirements Energy, 10 C.F.R. §431.196(a)(2) (2015) regardless of whether transformer date of manufacture is pre or post January 1, 2016. Proof of compliance Type Tests, for each transformer type and rating, must be based on U.S. DOE test methods Energy, 10 C.F.R. §431, Subpart K, Appendix A (2015). Type Test are required with each submission.
   2. Non-Linear Load Efficiency: This requirement is defined as meeting the efficiency requirements of NEMA TP1-2002 under non-linear loading, which has 100% THDI and a harmonic profile that is based on IEEE 519, Table 4.3 - 'Spectrum of Typical Switch Mode Power Supplies'. Proof of compliance Type Tests, for each transformer type and rating, must be based on the Voltage and Current Difference Loss Measurement Method using laboratory grade CTs and 0.1% accuracy Wattmeters OR shall be calculated in accordance with IEEE C57.110. Type Tests are required with each submission. The Power In – Power Out Measurements Method is not an acceptable test method due to the limitations associated with CT, PT and WattMeter accuracy.

1.8 FACTORY NAME PLATES

A. Provide two (2) – name plates per transformer indicating all code required items (i.e. kVA voltage, phase etc.). Name plates shall also include, phase shift and a name as indicated on transformer schedule or one-line diagram. The name plates shall be located on a non removable section of the outer shell.

1.9 ALTERNATES

A. In the event the contractor wishes to propose an alternative to the specified Harmonic Mitigating Transformers and/or Zero Sequence Harmonic Filters, the contractor shall provide the engineer with a detailed alternate Harmonic Mitigation Plan, which includes a schedule of proposed replacement devices that will meet all of the requirements described in this specification. The equipment proposal from the non-specified vendor(s) shall include the following information:
   1. Evidence of significant relevant application experience.
   2. Quantitative performance data including before/after effect on voltage distortion at the loads that demonstrates the vendor's capability to achieve the harmonic treatment called for in this specification.

3. Product technical specification and installation wiring diagram.
4. Pertinent product application information.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Type ‘DV’, Single Output, Harmonic Filtering Distribution Transformers (Dry Type) shall be provided for all transformers indicated with a zero (0), thirty (30), fifteen (15), forty-five (45), twenty (20) and forty (40) degree primary to secondary phase shifts.

B. Harmonic mitigating transformers with Wye configured primary windings are not acceptable.

C. Harmonic mitigating transformers without zig-zag configured secondary windings that completely cancel zero-sequence flux under balanced load conditions are not acceptable.

2.2 PRODUCT DESCRIPTION

A. The design of the harmonic filtering transformers, described in this Specification, shall be optimized for harmonic rich environments that are characterized by high neutral currents. These transformers shall:
   1. Provide an ultra-low zero sequence impedance path for all load-generated zero sequence harmonic currents, including I_3, I_9, I_{15}, I_{21}, etc.
   2. Provide for the cancellation of the 5th, 7th, etc. positive and negative sequence harmonic currents, at the units’ primary bus, when 0° and 30° (15° and 45°) phase-shifting units are used in combination.
   3. Provide for the cancellation of the 5th, 7th, 11th, 13th, etc. positive and negative sequence harmonic currents, at the units’ primary bus, when 0°, 20° and 40° phase-shifting units are used in combination.
   4. Provide for the cancellation of 5th, 7th, 11th, 13th, 17th, 19th, etc. positive and negative sequence harmonic currents, at the units’ primary bus, when 0°, 15°, 30° and 45° phase-shifting units are used in combination.
   5. Harmonic cancellation shall be by electromagnetic means only. No capacitors or electronics shall be used.
   6. Reduce voltage and current distortion and imbalance at the primary terminals of the unit.
   7. Reduce current crest factor at the primary terminals of the unit.
   8. Reduce average and peak phase current on the primary terminals of the unit.
   9. Reduce system losses.
   10. Improve system power factor.
   11. Reduce voltage distortion in the secondary sub-system.

2.3 DEVICE CONFIGURATION

A. Type: ANN

B. Insulation Class: 220°C

C. Temperature Rise: 150°C

D. System Frequency: 60 Hertz

E. Primary Voltage: 480 Volts Delta (Wye configured primary is not acceptable)

F. Secondary Voltage: 208/120 Volts Zig-Zag with two (2) windings per core leg for 0 degree phase shift and 208/120 Volt modified zig-zag with three (3) windings per core leg for 30, 15, 45, 20 and 40 degree phase shifts.

G. Phase: Three Phase

H. Rating: as scheduled on drawings

I. Primary-Secondary Phase-Shift: as scheduled on drawings

2.4 TRANSFORMER CHARACTERISTICS

A. Key Requirements
   1. Positive & negative sequence impedance: standard %
   2. Zero sequence reactance at 60Hz: < 0.3 %
   3. Zero sequence impedance at 60Hz: < 0.9 %
   4. Crest Factor suitability: 5
   5. BIL: 10,000 Volts (windings 1000V
   6. Capability to deliver full nameplate kVA to loads of K-factor up to: 30
   7. Neutral connection shall be rated at two times the ampacity of the secondary phase current.

B. Basic Requirements:
   1. Built to the following Standards: CSA C9-M1981, CSA22.2 No.47-1977, UL 506, IEEE C57.110, and NEMA ST 20
   2. Three-phase, common core construction
   3. Convection air-cooled
   4. Copper or Aluminum Windings
   5. Insulation Class: R(200 degree C)
   6. Magnetic field at 1.5 feet: max. 0.1 Gauss
   7. Full load Efficiency at 170°C
   8. Magnetizing Inrush Current: max. 10 times full load rating
   9. Taps: 2 x ± 2.5%
   10. Sound level: per C57.12.91
   11. Enclosure: ventilated, drip-proof NEMA-1 totally enclosed
   12. Finish: PQI white power coat
   13. Anti-vibration pads shall be used between the core and the enclosure

2.5 VENDOR INFORMATION

A. Evidence of significant relevant application experience.

B. Quantitative performance data including before/after effect on voltage distortion at load panels that demonstrates the capability to achieve the harmonic mitigation called for in this specification.

C. Product technical specification.

D. Pertinent product application information.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install transformer in accordance with manufacturer's written instructions, and recognized industry practices.

B. Housekeeping Pad: Provide a nominal 3-½" high, 2500 PSI (28 Day) concrete reinforced pad with number 6 welded wire mesh. The pad shall conform to the shape of the transformer and extend at least 3 inches beyond the length and width of the transformer. All corners of the pad shall be rounded.

C. Mounting: Install floor mounted transformers on properly sized rubber-in-shear vibration isolators. Trapeze mounted transformers shall use rubber-in-shear hangers. Wall mounted transformers shall not be mounted directly to the wall without vibration isolation.

D. Connection: Route conductors in a minimum of 2 feet of flexible steel conduit to transformer enclosure. Provide grounding conductor sized per NEC, connected to the building grounding electrode system.

3.2 FIELD TESTING

A. Insulation, Tests: Prior to energization, check transformers windings for continuity and test the insulation resistance. Tests shall be made using a Biddle Megger or equivalent test instrument, per manufacturers' recommendations.

Continuity Check

Primary	Pass / Fail		Secondary	Pass / Fail
H_1-H_2			X_1-X_0	
H_2-H_3			X_2-X_0	
H_3-X_1			X_3-X_0	

Insulation Resistance Test (1000V, DC)

Connections	Megohms
High to Low, Gnd	
Low to High, Gnd	
High, Low to Gnd	

B. Tap Setting: Measure current and voltage under load conditions to provide correct tap settings.

Tap Setting	Primary Voltage Reading		Secondary Voltage Reading	
	H_1-H_2		X_1-X_0	
	H_2-H_3		X_2-X_0	
	H_3-X_1		X_3-X_0	

C. Receptacle Tests: At the furthest receptacle from each panel serving a computer or copier, a power quality meter shall be used to determine the following:

Receptacle Test	
Panel Name (Fed From)	
Circuit Number	
Room Name or Number	

Location Inside Room	
Voltage (Line-Neutral)	
THD_V	
Voltage (Neutral-Ground)	
Current (Phase)	
THD_I	

D. Conduct all tests 3 to 6 months after building occupation. Submit all tests for Engineer's review.

END OF SECTION 26 22 22

SECTION 26 24 16 - PANELBOARDS

PART 1 - GENERAL

1.1 SCOPE

A. Provide panelboards as shown, scheduled and as specified herein.

B. The types of panelboards include:
   1. Panelboards.
   2. Power distribution panelboards.
   3. Load centers

1.2 STANDARDS

A. Products shall be designed, manufactured, tested and installed in compliance with UL, NEMA and ANSI applicable standards.
   1. UL 50 and UL 50E - Enclosures for Electrical Equipment
   2. UL 67 - Panelboards
   3. UL 489 - Molded Case Circuit Breakers and Circuit Breaker Enclosures
   4. UL 943 - Ground fault Circuit Interrupters
   5. NEMA PB 1 - Panelboards
   6. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less
   7. NEMA, ABI, Molded Car Circuit Breakers and Molded Case Switches
   8. Federal Spec W-P 115, Rev C, Panel, Power Distribution
   9. NEMA KSI, Enclosed and Miscellaneous Distribution Equipment Switches (600V)
   10. NFPA 70 - National Electrical Code (NEC)
   11. ANSI C12.1 - Electric Meters - Code for Electricity Metering
   12. ANSI C12.20 - American National Standard for Electricity Meters - 0.2 and 0.5 Accuracy Classes

B. Products shall conform to all applicable UL standards and shall be UL-labeled.

1.3 ACCEPTABLE MANUFACTURERS

A. Provide one of the following manufacturers:
   1. General Electric Company/ABB
   2. Square D Company
   3. Siemens
   4. Eaton

1.4 SUBMITTALS

A. Shop drawings shall include, but not be limited to:
   1. Cutsheets of all enclosures, circuit breakers, fusible switches, bussing, rating, schedules and all accessories clearly labeled.

1.5 REQUIREMENTS OF REGULATORY AGENCIES

A. WORK IN ACCORDANCE WITH:

1. National Electrical Code.
2. Local, municipal, or state codes that have jurisdiction.

PART 2 - PRODUCTS

2.1 MATERIALS AND COMPONENTS

A. General
1. Provide power distribution and panelboards as indicated in the panelboard schedule and as shown on the plans. Power distribution panelboards shall be equipped with fusible switches or circuit breakers as shown on the schedule. Panelboards shall be equipped with thermal-magnetic, molded case circuit breakers of frame and trip ratings as shown on the schedule.
2. A Fully-rated system shall be provided. Do not series-rate.

B. Busing Assembly and Temperature Rise
1. Panelboard bus structure and main lugs or main breaker shall have current ratings as shown on the panelboard schedule. Such ratings shall be established by heat rise tests with maximum hot spot temperature on any connector or bus bar not to exceed 149°F. rise above 104°F ambient. Heat rise test shall be conducted in accordance with Underwriters Laboratories Standard UL 67. The use of conductor dimensions will not be accepted in lieu of actual heat tests. All current carrying parts of the bus shall be tin or silver plated copper.
2. Bus structure shall be isolated. Bus bar connections to the branch circuit breakers shall be distributed phase or phase sequence type and shall accept bolt-on circuit breakers for lighting and appliance panelboards.
3. The lugs for terminating conductors shall be rated at 167°F on all panel boards and circuit breakers.
4. Provide a non-insulated bare copper ground bus. Provide an isolated ground copper bus in each panel serving isolated ground circuits as indicated on panel schedule or one-line diagram. Provide a full size copper neutral bus in each panelboard enclosure. Provide a 200% neutral buss when served by a harmonic mitigating transformer and any K4 or higher rated transformers.

C. Distribution Panelboards
1. Provide arc energy reduction switch for each overcurrent device rated 1200 amps or larger to comply with 240.87 of the NEC. Switch shall be equipped with a pad lockable cover with a blue LED pilot light that illuminates when system is activated. Locate switch and cover recessed mounted adjacent to the switch it serves or remote as indicated on the plans. Provide label and all required hardware. Remote switch(es) shall be flush mounted in wall near entry to the room.
2. Circuit breakers shall be equipped with individually insulated, braced and protected connectors. The front faces of all circuit breakers shall be flush with each other. Large, permanent, individual circuit numbers shall be affixed to each breaker in a uniform position. Tripped indication shall be clearly shown by the breaker handle taking a position between “ON” and “OFF”. Provisions for additional breakers shall be such that no additional connectors will be required to add breakers. Circuit breakers shall be of the frame size, trip setting and interrupting capacity as indicated on the drawings. Circuit breakers shall be rated 65,000 AIC unless otherwise noted on plans.

D. 480/277 Volt Panelboards

1. Main breakers shall be vertically mounted. Branch mounted main breakers are not acceptable. Provide electronic trip mains with long term, short term and instantaneous trips as indicated on drawings and required for selective coordination.
2. Circuit breakers shall be bolt-on thermal-magnetic, molded case circuit breakers. Breakers shall be 1, 2 or 3 pole with an integral crossbar to assure simultaneous opening of all poles in multiple circuit breakers. Breaker shall have an over-center, trip-free, toggle-type operating mechanism with quick-make, quick-break action and positive handle indication. Handles shall have “ON”, “OFF” and “TRIPPED” positions. Circuit breakers shall be UL listed in accordance with UL Standard 489 and shall be rated 277 volt ac (single pole, 15-30 amperes) or 480Y/277 volts ac (2 and 3 pole) with continuous current ratings as noted on the plan. Interrupting ratings shall be a minimum of 18,000 rms symmetrical amperes at 277 volts ac (single pole) or 480Y/277 volts ac (2 and 3 pole) unless otherwise noted on plans.

E. 240 (208) Volt Panelboards
1. Main breakers shall be vertically mounted. Branch mounted main breakers are not acceptable. Provide electronic trip mains with long term, short term and instantaneous trips as indicated on drawings and required for selective coordination.
2. Circuit breakers shall be bolt-on thermal-magnetic, molded case circuit breakers. Breakers shall be 1, 2, or 3 pole with an integral crossbar to assure simultaneous opening of all poles in multiple circuit breakers. Breakers shall have an overcenter, trip-free, toggle-type operating mechanism with quick-make, quick-break action and positive handle indication. Handles shall have "ON", "OFF" and "TRIPPED" positions.
3. Circuit breakers shall be UL listed in accordance with UL standard 489 and shall be rated 240 volts ac maximum with continuous current rating as noted on the plans.
4. Branch circuit breakers feeding convenience outlets shall have sensitive instantaneous trip settings of not more than 10 times the trip settings of the breaker to prevent repeated arcing short resulting from frayed appliance cords. Single pole 15 and 20 ampere circuit breakers shall be UL listed as "Switching Breakers" at 120V ac and carry the SWD marking.
5. UL Class A 5mA ground fault circuit protection shall be provided on all receptacle circuits serving wet areas and on all 120V ac branch circuits as specified on the plans or panelboard schedule. This protection shall be an integral part of the branch circuit breaker which also provides overload and short circuit protection for branch circuit wiring. Tripping of a branch circuit breaker containing ground fault circuit interruption shall not disturb the feeder circuit to the panelboard. A single pole circuit breaker with integral ground fault circuit interruption shall require no more panelboard branch circuit space than a conventional circuit breaker.
6. UL Class B 30mA ground fault circuit protection (GFEP) shall be provided on all equipment circuits requiring ground fault protection. This protection shall be an integral part of the branch circuit breaker which also provides overload and short circuit protection for branch circuit wiring.
7. Provide Shunt Trip Breakers including control power for circuits under cooking hoods and other equipment having this requirement.
8. Provide Breakers with Switched Neutral circuits with common trip for gasoline pumps and other equipment having this requirement.
9. Circuit breakers shall be rated 10,000 AIC at 240V unless otherwise noted on plans or served by transformers greater than 150 kVA.
10. Provide 200% sized neutral bus with panels served from a non-linear transformer and any K4 or higher rated transformers. This shall be a UL approved assembly.

F. Cabinets and Fronts
   1. The panelboard bus assembly shall be enclosed in a steel cabinet. The rigidity and gauge of steel to be as specified in UL 50 for cabinets. Wiring gutter space shall be in accordance with UL 67 for panelboards. The box shall be fabricated from galvanized steel or equivalent rust resistant steel. Provide stainless steel front cover for all panels located in all Pool Equipment rooms, Food Labs, Snack Bars, Culinary Arts, Kitchens and Life Skills rooms. All NEMA-1 panels shall have hinged front covers. The front cover shall have a door with hinges, latch and a lock. The piano hinged front covers door-in-door shall allow full access to the circuit breaker gutter area without having to remove the entire front cover. All panelboard lock shall be keyed alike. Circuit breaker and fusible distribution panels shall have four-piece trims. A welded circuit directory frame and card with a clear plastic covering shall be provided on the inside of the door. Provide NEMA 1 enclosure where installed indoors unless otherwise noted. Provide NEMA 3R enclosure where installed outside or in a sprinkled area.

G. Safety Barrier
   1. The distribution panelboard interior assembly shall be dead front with panelboard cover removed. Main lugs or main breakers shall have a barrier. The barrier in front of the main lugs shall be hinged to a fixed part of the interior. The end of the bus structure opposite the mains shall have barriers.

H. Integrated Equipment Short Circuit Rating
   1. Each panelboard, as a complete unit, shall have a short circuit current rating equal to or greater than the integrated equipment rating shown on the panelboard schedule or on the plans. This rating shall be established by testing with the over-current devices mounted in the panelboard. The short circuit tests on the over-current devices and on the panelboard structure shall be made simultaneously by connecting the fault to each over-current device with the panelboard connected to its rated voltage source. Method of testing shall be per UL 67. The source shall be capable of supplying the specified panelboard short circuit current or greater. Testing of panelboard over-current devices for short circuit rating only while individually mounted is not acceptable. Also, testing of the bus structure alone is not acceptable. Panelboards shall be marked with their maximum short circuit current rating at the supply voltage and shall be UL listed.

I. {CH#54591}

PART 3 - EXECUTION

3.1 INSTALLATION

1. Provide load centers where indicated.

B. General: Install panelboards, including electrical connections, in accordance with manufacturers written instructions, NEC and recognized industry practices.

C. All panels shall be mounted to unistrut. Unistrut shall be securely mounted to the floor and structural ceiling. Toggle bolts or anchor bolts attached to drywall is not acceptable.

D. Housekeeping Pads: Mount floor mounted panelboards on 4 inch high concrete housekeeping pads where inside the building, 6" housekeeping pad where outside the building. Incfre

E. Recessed Panels: Stub up three one inch conduits to an accessible location above the ceiling for each recessed panelboard.

3.2 IDENTIFICATION

A. Nameplate: Each panelboard shall have an engraved bakelite nameplate. Nameplates shall be white with black letters and show panel designation. Nameplates shall be attached with stainless steel screws. Refer to Section 26 02 00, paragraph 2.8(C).

B. Directory Card: Cardholders and directory cards shall be furnished for circuit identification in panelboards. Cardholder shall be located on inside of panel door and shall be in a metal frame with clear plastic front. Circuit lists shall be typewritten. Circuit descriptions shall include location and name of each item of equipment served. Spares and spaces shall be written in erasable pencil for future use. Circuit directory shall show the room served by each circuit. The final graphs/signage room numbers shall be used. Do not use Architectural numbering on plans.

C. Replacement Components: Nameplate shall identify replacement components.

END OF SECTION 26 24 16

SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

1.1 SCOPE

A. Provide wiring devices as shown; scheduled, required and as specified.

B. The types of wiring devices required include:
   1. Receptacles
   2. Switches
   3. Coverplates

1.2 STANDARDS

A. NEMAWD-1

B. NEMA WD-5

C. UL

D. Federal Spec WC-596-F and WS-896

1.3 ACCEPTABLE MANUFACTURERS

A. Hubbell

B. Leviton

C. Pass & Seymour

1.4 SUBMITTALS

A. Shop drawings shall include but not be limited to:
   1. Cut sheets of all devices indicating NEMA configuration, rating, materials, color, and all accessories.
   2. Cut sheets of all coverplates indicating materials, color and any engraving specified on drawing or in the specifications.

1.5 REQUIREMENTS OF REGULATORY AGENCIES WORK IN ACCORDANCE WITH:

A. National Electric Code.

B. Local, municipal, or state codes that have jurisdiction.

PART 2 - PRODUCTS

2.1 MATERIALS AND COMPONENTS

A. GENERAL
   1. Provide factory assemble wiring devices with the rating type and color as required and specified for the service indicated.
   2. Provide matching one-piece multiple gang plates where switches are ganged.

3. Provide wall plates for each receptacle furnished.
4. Architect reserves the right to select wiring device styles and colors to match wall finish.
5. Wall plates shall be of same manufacturer as devices.

2.2 SWITCHES

A. Provide specification grade White toggle switches where indicated on the Drawings. Provide "Red" switches for switching emergency lighting circuits where switching is indicated. Coordinate exact locations with architect.
   1. Wall switches shall be 20 amp, 120-277 volt and shall be Hubbell, Leviton or P&S as follows:
      a. SINGLE POLE SWITCHES: Hubbell HBL1221, Leviton 1221-2, P&S PS20AC1
      b. DOUBLE POLE SWITCHES: Hubbell HBL1222, Leviton 1222-2, P&S PS20AC2
      c. THREE WAY SWITCHES: Hubbell HBL1223, Leviton 1223-2, P&S PS20AC3
      d. FOUR WAY SWITCHES: Hubbell HBL1224, Leviton 1224-2, P&S PS20AC4
      e. MOMENTARY CONTACT SWITCHES: Hubbell HBL1557, Leviton 1257, P&S 1251
      f. THREE POSITION, TWO CIRCUIT MAINTAINED CONTACT SWITCHES: Leviton 1285, Hubbell HBL1385, P&S 1225
      g. KEY TYPE LOCKABLE BARREL KEY OR CORBIN STYLE: Leviton 1221-2KL with 2KL key or P&S PS20AC1-KL with 4609 key for each switch, Hubbell #HBL 1221-RKL.
   2. Dimmers: Provide Lutron DIVA or as shown on drawings. Wall box dimmers shall be sized to handle the load. Where fluorescent dimming ballasts are to be used, coordinate wall box dimmer with ballast manufacturer.
   3. Light Handle Switches: Provide Leviton 1221-LHC, Hubbell HBl1221-ll, P&S PS20AC1-ISl lighted handles to switch emergency lights were noted on the drawings.

B. Provide specification grade White decora style rocker switches where indicated on the Drawings. Provide "Red" switches for switching emergency lighting circuits where switching is indicated. Coordinate exact locations with architect.
   1. Wall switches shall be 20 amp, 120-277 volt and shall be Hubbell Decorator Series, Leviton, Decora or Pass & Seymor Decorator, as follows:
      a. SINGLE POLE SWITCHES: Leviton 5621-2, P&S 2621, Hubbell DS120
      b. DOUBLE POLE SWITCHES: Leviton 5622-2, P&S 2622, Hubbell DS220
      c. THREE WAY SWITCHES: Leviton 5623-2, P&S 2623, Hubbell DS320
      d. FOUR WAY SWITCHES: Leviton 5624-2, P&S 2624, Hubbell DS420
      e. MOMENTARY CONTACT SWITCHES: Hubbell HBL1557, Leviton 1257, P&S 1251
      f. THREE POSITION, TWO CIRCUIT MAINTAINED CONTACT SWITCHES: Leviton 1285, Hubbell HBL1385, P&S 1225
   2. Dimmers: Provide Lutron DIVA wall box dimmers sized to handle the load or as shown on drawings. Where fluorescent dimming ballasts are to be used, coordinate wall box dimmer with ballast manufacturer.
   3. Light Handle Switches: Provide Leviton 5649-2 or P&S 2625 lighted handles to switch emergency lights where noted on the drawings.

2.3 RECEPTACLES

A. Provide specification grade White receptacles where indicated on the drawings. Provide “Red” receptacles for receptacles on emergency power. Coordinate exact location with architect.
   1. Receptacles shall be Hubbell, Leviton or Pass & Seymour as follows:
      a. Duplex 20A-125V-self grounding with Brass mounting yoke (NEMA configuration 5-20R): Hubbell HBL5352, Leviton 5362, P&S 5362A

b. Simplex 20A-125V-Self Grounding with Brass mounting yoke (NEMA configuration 5-20R): Hubbell HBL5361, Leviton 5361, P&S 5361 with Brass mounting yoke.
c. Isolated ground duplex, 20A-125V: (Orange, NEMA configuration 5-20R) Hubbell IG5352, Leviton 5362IG , P&S IG5362.
d. Clock hanger receptacle 15A-125V: (Brown with stainless steel plate with hanger, NEMA configuration 5-15R): Leviton 5361-CH, Hubbell 5235, P&S S3733-SS
e. Ground fault circuit interrupter (GFCI) receptacle 20A-125V; (NEMA Configuration 5-20R, shall incorporate self-test, auto monitoring technology and features which will lock-out or render the device incapable of being reset if ground fault protection is compromised, with "Feed through" connectors capable of protecting connected downstream receptacles on a single circuit, and of being installed in a 2-3/4" deep outlet box without adapter, Hubbell GFRST20, Leviton GFNT2 or P & S 2097.
    1) Install Hubbell GFTRST20, Leviton GFTR2 or P&S 2097TR Tamper Resistant type for locations requiring Tamper Resistant installations
    2) Install Hubbell GFTWRST20, Leviton GFWR2 or P&S 2097TRWR Weather Resistant type for installations in damp or wet locations
f. Tamper resistant receptacles 20A-125V (NEMA configuration 5-20R): Hubbell HBL8300SGA, Leviton 8300, P&S TR63-H.
g. Surge Protection Duplex Receptacles 20A-125V, Decora Style only (NEMA 5-20R): Hubbell HBL5360, Leviton 5280, Legrand 5362
h. Equipment receptacles shall be coordinated with owner/manufacturer requirements and the correct and appropriate receptacle and coverplate shall be installed.
i. USB Charger types receptacles shall be Hubbell, 20A, 125V AC Hospital Grade, Tamper Resistant, with two USB Type 2.0 Ports 5.0 Amp, 5V DC, Decorator Type duplex receptacle. Hubbell USB8300A5 or P&S TR20HUSBAC6.
j. Plug load controlled receptacles shall be Hubbell DR20C2WHI or P&S 26352CDW white and two controlled faces.
k. ARC Fault circuit interrupter receptacles shall be Hubbell AFR20TR or P&S AF202TR.
l. Ground fault circuit interrupter/ARC Fault dual function receptacles shall be Hubbell AFGF20TR or P&S AFGF202TR.

B. Provide specification grade, Decora type White receptacles where indicated on the drawings. Provide “Red” receptacles for receptacles on emergency power. Coordinate exact location with architect.
    1. Receptacles shall be Hubbell StyleLine Decorators Series, Leviton, Decora or Pass & Seymour Decorator as follows:
        a. Duplex 20A-125V-self grounding: (NEMA configuration 5-20R): Hubbell DR20, Leviton 16362, or P&S 26342.
        b. Simplex 20A-125V-Self Grounding: (NEMA configuration 5-20R): Leviton 1635 or P&S 26361.
        c. Isolated ground duplex, 20A-125V: (Orange, NEMA configuration 5-20R) Hubbell IG20DRX, Leviton 16362-IG or P&S IG26362 (where X denotes color).
        d. Clock hanger receptacle 20A-125V: (Brown with stain finish stainless steel plate with hanger, NEMA configuration 5-20R): Hubbell 5235, Leviton 5361-CH P&S S3733-SS
        e. Ground fault circuit interrupter (GFCI) receptacle 20A-125V; GF-5352. (NEMA Configuration 5-20R, shall incorporate self-test, auto monitoring technology and features which will lock-out or render the device incapable of being reset if ground fault protection is compromised, with "Feed through" connectors capable of protecting connected downstream receptacles on a single circuit, and of being installed in a 2-3/4" deep outlet box without adapter,Hubbell GFRST20, Leviton GFNT2 or P&S 2097
            1) Install Hubbell GFTRST20, Leviton GFTR2 or P&S 2095TR Tamper Resistant type for locations requiring Tamper Resistant installations
            2) Install Hubbell GFTWRST20, Leviton GFWR2 or P&S 2097TRWR Weather Resistant type for installations in damp and wet locations.

f. Tamper resistant receptacles 20A-125V: (NEMA configuration 5-20R): Hubbell DR20TR, Leviton 16262-SG, P&S TR26362 - HIGH LTG.
g. Surge Protection Duplex Receptacles 20A-125V, (NEMA 5-20R): Hubbell HBL5360, Leviton 5280, Legrand 5362
h. Special equipment receptacles shall be coordinated with owner/manufacturer requirements and the correct and appropriate receptacle and coverplate shall be installed.
i. USB Charger types receptacles to b Hubbell, 20A, 125V AC Hospital Grade, Tamper Resistant, with two USB Type 2.0 Ports 5.0 Amp, 5V DC, Decorator Type duplex receptacle. Hubbell USB8300A5, P&S TR20HUSBAC6 or equal by other approved wiring device manufacturers.
j. Plug load controlled receptacles to be Hubbell DR20C2WHI or P&S 26352CD white, two controlled faces or equal by Leviton.
k. ARC Fault circuit interrupter receptacles shall be Hubbell AFR20TR
l. Ground fault circuit interrupter/ARC Fault dual function receptacles shall be Hubbell AFGF20TR or P&S AFGF202TR.

2.4 MDF/IDF/TECHOLOGY ROOMS

A. All receptacles in these spaces shall contain isolated ground conductors, to an isolated ground system upstream from the electrical Panel serving these spaces.

B. all receptacles

2.5 OCCUPANCY SENSORS

A. Provide White dual technology wall mounted sensors, provide one of the following:
1. Single Pole:
a. Wattstopper #DSW301
2. Double Pole:
a. Wattstopper # DSW302
3. Dimmer:
a. Wattstopper #DW311

B. Provide dual technology ceiling sensor with low voltage controlling switch and power pack.
1. Single Button:
a. Wattstopper # DT300 Sensor, BZ150 Power Pack and LVSW101 Digital Switch

C. Provide Ultra Sonic Ceiling sensor for restrooms.
1. Wattstopper #UT3000, BZ150 Power Pack

2.6 DIGITAL TIMER SWITCHES

A. Provide Wattstopper TS-400-G digital timer. Locate in mechanical, electrical, MDF, and IDF rooms.

B. The time switch shall provide audible notification and visual notification (blink the room lights) prior to turning lights off.

C. The time switch shall have a 12-hour manual override setting.

2.7 PLATES

A. Furnish and install plates on all outlet boxes. Oversize (Jumbo) plates are not acceptable.

B. Plates shall be smooth nylon and 302/304 smooth stainless steel in kitchen and coffee bar areas.

C. Provide Hubbell WP Series, Bell, Carlon or Leviton NEMA 3R weatherproof coverplates on all exterior wiring devices. Enclosure shall be suitable for wet locations when in use.

D. Plates shall be Hubbell SS Series, Leviton, Pass & Seymour 302/304 smooth stainless steel on all receptacles 30 amps and larger.

E. Stainless steel device plates shall be provided at locations with tile or stone walls.

PART 3 - EXECUTION

3.1 WIRING DEVICE MOUNTING HEIGHTS

A. Reference Architectural and Electrical elevation details. Architectural elevations supersede Electrical elevations indicated. Failure to confirm mounting heights of all devices with architect and owner prior to rough-in may consitute rework at the expense of the contractor.

3.2 INSTALLATION (REFER TO 26 05 33 FOR OUTLET BOX SPECIFICATIONS).

A. Wall switches shall be set in a suitable steel box and shall be installed on the strike side of the door as finally hung, whether so indicated on the Drawings or not.

B. Receptacles shall be installed in a suitable steel box.

C. The Architect reserves the right to relocate wiring device up to a distance of 5 feet from the location shown, before rough-in, without additional cost.

D. Provide multi-gang device covers at locations where devices gang together.

E. Device locations are indicated schematically on the drawings along with the type and mounting height. Final locations and mounting heights shall be coordinated with the Architect on the jobsite, and with shop drawings of equipment; including equipment to be furnished and installed by the Owner. Devices installed in walls covered with vinyl, fabric wallpaper or other special finishes shall be coordinated and verified with the Architect on the job-site.

F. Stranded wire termination to switches, receptacles, devices and miscellaneous control devices shall be with an approved solderless terminal if clamp type securing is not possible (i.e. Sta-Con crimp on fork tongue connectors; Burndy Type TP-F).

G. Provide keyed switches in all common areas not monitored by the faculty (i.e. gym, corridors, cafeteria, commons natatoriums).

H. Tamper-resistant type receptacles shall be installed in all classrooms, cafeterias, corridors, special education, ALE, computer labs, special use classroom and all spaces where children 7 years and younger may occupy. In Child-Care facilities, tamper resistant receptacles shall be provided for all spaces with exception to back-of-house spaces, such as kitchens, custodial closets, electrical and mechanical rooms.

I. All 20A, 120V receptacles in food service areas shall be GFCI.

J. All circuit breaker serving electric drinking fountains shall be GFCI.

K. Provide ARC Fault circuit interrupters (AFCI) as required to comply with 210.12 of the N.E.C. This shall include but not be limited to dwelling units and dormitories. AFCI breakers may be used.

L. Provide ground fault circuit interrupter (GFCI)/ARC Fault circuit interrupter (AFCI) dual function receptacles to comply with 210.8, 210.12 and 406.4 of the N.E.C.

END OF SECTION 26 27 26

SECTION 26 28 16 - SAFETY AND DISCONNECT SWITCHES

PART 1 - GENERAL

1.1 SCOPE

A. Provide safety and disconnect switches as shown, scheduled and as specified herein.

1.2 STANDARDS

A. Products shall be designed, manufactured, tested and installed in compliance with applicable standards.
   1. NEMA KS1 - Enclosed switches
   2. Federal specification W-S-865C-Heavy duty switches

B. Products shall conform all applicable UL standards, including UL98 (standard for safety, enclosed and dead front switches) and shall be UL-labeled.

1.3 ACCEPTABLE MANUFACTURERS

A. Provide one of the following manufacturers:
   1. General Electric Company/ABB
   2. Square D Company
   3. Siemens
   4. Eaton

1.4 SUBMITTALS

A. Shop drawings shall include, but not be limited to:
   1. Cutsheets of switches with ratings, physical dimensions and all accessories clearly labeled.

1.5 REQUIREMENTS OF REGULATORY AGENCIES

A. WORK IN ACCORDANCE WITH:
   1. National Electrical Code.
   2. Local, municipal, or state codes that have jurisdiction.

PART 2 - PRODUCTS

2.1 GENERAL

A. Furnish and install heavy duty type safety switches with the number of switched poles as indicated on the plans and specifications. All safety switches shall be NEMA Heavy Duty Type HD, and Underwriters Laboratories listed.

2.2 MATERIALS AND COMPONENTS

A. Switch Interior

1. All switches shall have switch blades that are fully visible in the "OFF" position when the door is open. Switches shall have removable arc suppressor where necessary, to permit easy access to line side lugs. Lugs shall be front removable and UL listed for 60ºC and 75ºC copper or aluminum cables. All switches blades and contacts shall be plated copper. Adjust fuse block to accept Class J fuses.

B. Switch Mechanism
   1. Switches shall have a quick-make and quick-break operating handle and mechanism, which shall be an integral part of the box, not the cover. Padlocking provisions shall be provided for locking in the "OFF" position with at least three padlocks. Switches shall have a dual cover interlock to prevent unauthorized opening of the switch door when the handle is in the "ON" position, and to prevent closing of the switch mechanism with the door open. A means shall be provided to permit authorized personnel to release the interlock for inspection purposes. Handle position shall indicate if switch is "ON" or "OFF".

C. Neutral
   1. Provide a solid neutral with the safety switch where a neutral is present in the circuit.

D. Ratings
   1. Switches shall be horsepower rated for ac and/or dc as indicated by the plans. The fused switches shall have Class R rejection fuse clips or adjusted for Class J fuses. UL listed short circuit ratings of the switches, when equipped with Class R fuses, shall be 200,000 symmetrical amperes.

E. Enclosures
   1. Indoor switches shall be furnished in NEMA 1 enclosures.
   2. Outdoor switches, switches located in wet areas or sprinkled areas shall be furnished in NEMA 3R enclosures.
   3. Switches installed in wet areas such as cooling tower areas shall be NEMA 4X stainless steel or fiberglass reinforced polyester.
   4. Switches installed in kitchens shall be stainless steel.
   5. Switches installed in areas of a corrosive nature and subjected to salt air shall be NEMA 4X stainless steel or fiberglass reinforced polyester.

F. Electrical Interlock Contacts
   1. Provide electrical interlock contacts on all disconnect switches serving motors in which remote VFDs are serving the motor. Provide conductors from contacts to the safe circuit inside the VFD. De-energizing the disconnect switch shall signal VFD to stop.

G. Service Entrance
   1. Switch shall be suitable for use as service entrance equipment when installed in accordance with the National Electrical Code.

PART 3 - EXECUTION

3.1 GENERAL

A. Install safety and disconnect switches, including electrical connections, and fuses in accordance with manufacturer’s written instructions, NEC and recognized industry practices.

B. Location: Install switches within sight of controllers.

C. Hubs: Provide bolt-on hubs for rainproof or wet area applications.

3.2 IDENTIFICATION

A. Nameplate: Each disconnect switch shall have an engraved bakelite nameplate. Nameplates shall be white with black letters and show equipment served. Nameplates shall be attached with stainless steel screws.

END OF SECTION 26 28 16

SECTION 26 43 13.13 - SURGE PROTECTIVE DEVICES (SPD) - STANDARD INTERRUPTING

PART 1 - GENERAL

1.1 SCOPE

A. Specify the electrical and mechanical requirements for a non-modular high-energy surge protective device system (SPD). The specified system shall provide effective high energy surge current diversion and be suitable for application in IEEE C62.41.1 Category A, B and C3 environments, as tested by IEEE C62.11, IEEE C62.45.

B. The system shall be constructed using multiple surge current diversion modules utilizing metal oxide varistors (MOV) computer matched to +/- 1-volt variance and tested for manufacturer's defects. The modules shall be designed and constructed in a manner that ensures surge current sharing. Use of gas tubes, silicon avalanche diodes or selenium cells are unacceptable. Devices shall utilize a minimum of three (3) MOV's fuse links pair per phase. This will allow greater than 50% redundant protection in if a MOV fails.

C. Third Party Test Report verifying surge current rating, longevity, testing, and filtering capabilities shall be provided with submittal.

1.2 STANDARDS

A. The specified system shall be designed, manufactured, tested and installed in compliance with the following codes and standards:
   1. Canadian Standards Association (CSA or CUL)
   2. American National Standards Institute and
   3. Institute of Electrical and Electronic Engineers (IEEE C62.11, IEEE C62.41.1, IEEE C62.41.2 and IEEE C62.45)
   4. Institute of Electrical and Electronic Engineers 1100 Emerald Book
   5. Federal Information Processing Standards Publication 94 (FIPS PUB 94)
   6. National Electrical Manufacturer Association (NEMA LS-1 1992)
   7. National Fire Protection Association (NFPA 20, NFPA 70, NFPA 75 and NFPA 780)
   8. National Electric Code
   9. Underwriters Laboratories (UL 1449 and UL 1283)
   10. International Electrotechnical Commission (IEC 801)
   11. International Standards Organization (ISO) Company certified ISO 9001 for manufacturing, design and service
   12. EMC Directive 89/336/EEC - CE compliant

B. The systems individual units shall be UL/ANSI Listed and labeled under UL 1449 (Fourth Edition) Standard for Surge Protection Devices Type 2 20kA with a nominal discharge current of 20kA and the surge ratings shall be permanently affixed to the SPD. The units shall also be listed and labeled to UL 1283 for type 2 locations Standard for Electromagnetic Interference Filters, and CSA/CUL Listed.

1.3 ACCEPTABLE MANUFACTURERS

A. Southern Tier Technologies

1.4 SUBMITTALS

A. Shop drawings shall include, but not be limited to:
   1. Cutsheets of surge protection devices with ratings, physical dimensions and all accessories clearly labeled.
   2. Device labels shall be clearly indicated in cutsheets.
   3. All standards and listings, as specified in section 1.2A-B, shall be clearly labeled in cutsheets provided.
   4. Cutsheets shall clearly outline that design requirements of this specification have been met.

1.5 QUALITY ASSURANCE

A. The manufacturer shall be ISO 9001 certified. The specified system shall be tested at the component and fully assembled level, under surge conditions with AC power applied for a minimum of 1 hour. Testing shall include but not be limited to quality control checks, dielectric voltage withstand test per UL and CSA requirements, UL ground continuity tests and operational and calibration tests.

B. The unit shall be designed and manufactured in the USA by a qualified manufacturer of surge protection equipment and Active Tracking Filters. The manufacturer shall have been engaged in the design and manufacture of such products for a minimum of 10 years.

PART 2 - PRODUCTS

2.1 ENCLOSURE

A. The specified system shall be provided in a heavy duty NEMA 4 or better dust-tight, drip-tight enclosure with no ventilation openings.

2.2 OVERCURRENT PROTECTION (FUSING)

A. Individual surge components shall be fused to prevent violent failure. The fusing shall be UL listed and shall be capable of interrupting up to 200kA symmetrical fault current with 480VAC applied. Replaceable fusing is unacceptable. Overcurrent protection that limits specified surge currents is not acceptable. Devices that utilize a single fuse to protect two or more suppression paths are not accepted.

2.3 DESIGN REQUIREMENTS

A. Protection Modes:
   1. The SPD shall provide protection as follows: All modes, L-N or L-L, L-G and N-G (where applicable) Note: L = Line, G = Ground, N = Neutral

B. UL 1449 Ratings:
   1. The maximum UL 1449 listed surge ratings for each and/or all of the specified protection modes shall not exceed the following in any mode of protection:

System Voltage	Voltage Protection Rating			
	L-N	L-L	N-G	L-L
120/240	600-volts	700-volts	700-volts	1200-volts
120/208	600-volts	700-volts	700-volts	1200-volts

240		1200-volts		1000-volts
277/480	1200-volts	1200-volts	1200-volts	1800-volts
480		1800-volts		1800-volts

C. Noise Attenuation:
   1. The unit shall be UL 1283 Listed as an electromagnetic interference filter in type 2 locations. The filter shall provide insertion loss with a maximum of 60 dB from 100 KHz to 100 MHz per 50 Ohm Insertion Loss Methodology from MIL 220A. The system shall provide up to 120 dB insertion loss from 100 KHz to 100 MHz when used in a coordinated facility system.

D. Life Cycle Testing:
   1. The SPD system shall be duty life cycle tested to survive 6,000 20kV, 10kA Surges, per IEEE C62.41.1 Category C3 surge current with less than 5% degradation of clamping voltage.

2.4 CONNECTIONS

A. Provide 60” wire leads #10 AWG or UL 1449 tested size.

2.5 STANDARD FEATURES

A. Unit Status Indicators:
   1. Red and green solid state indicators with printed labels shall be provided on the front cover to redundantly indicate on-line unit status including N-G monitoring. The absence of the green light and the presence of the red light shall reliably indicate that surge protection is reduced and service is needed to restore full operation.

B. Dry Contacts for remote monitoring:
   1. Electrically isolated Form C dry contacts, one normally open and one normally closed set standard on all units for remote monitoring.

C. Undervoltage detection:
   1. Unit shall be equipped with 70% undervoltage detection capability.

D. Phase Loss Monitoring:
   1. Unit shall be equipped with phase loss monitoring.

E. Power Loss Monitoring:
   1. Unit shall be equipped with power loss monitoring.

2.6 TESTING

A. Component Testing and Monitoring:
   1. Unit shall include an on-line circuit which tests and redundantly monitors individual components in all protection modes including neutral to ground (where applicable). Units that require external test sets or equipment are not acceptable.

2.7 ENVIRONMENTAL REQUIREMENTS

A. Storage Temperature: -67 to +187 F

B. Operating Temperature: -40 to 140 F

C. Relative Humidity: 0% to 95%

D. Audible Noise: less than 45 dBa at 5 feet.

E. Operating Altitude: 0 to 18,000 feet above sea level.

2.8 WARRANTY

A. The manufacturer shall provide a full 10 year parts and a 5 year labor warranty from date of shipment against any part failure when installed in compliance with manufacturer's written instructions, UL Listing requirements and any applicable national, state or local electrical codes. Direct, factory trained, ISO 9001 certified employees must be available for 48 hour assessment. A 24 hour 800 number must be available to support warranty.

2.9 PART 3 - EXECUTION

A. INSTALLATION
   1. Install the parallel SPD with short and straight conductors as practically possible. Locate adjacent to the switchboard or panel it is serving. The contractor shall twist the SPD input conductors together to reduce input conductor inductance. The contractor shall follow the SPD manufacturer's recommended installation practices as found in the installation, operation and maintenance manual and comply with all applicable codes. Maximum length of conductors from connection at breaker to termination at SPD shall not exceed 18". Failure to meet this length shall require relocation of SPD.
   2. Provide Flush Mount Stainless Steel Cover Kit for kitchen areas.
   3. Provide Flush Mount Cover Kit for residential units and hotel suites.

END OF SECTION 26 43 13.13

SECTION 26 51 19 - LIGHTING FIXTURES - LIGHT EMITTING DIODE (LED)

PART 1 - GENERAL

1.1 SCOPE

A. Provide general and emergency lighting fixtures as noted on the drawings. Fixtures shall be completely wired with lamps installed and shall be in perfect operating condition at the time of substantial completion.

B. The types of lighting fixtures required for this project include:
   1. LED

1.2 STANDARDS

A. All fixtures shall conform to all applicable UL standards and shall be UL label including damp and wet location ratings. “ETL listed” is an acceptable listing.

B. NFPA 101

C. ANSI C82.1

D. NEMA-LE

E. All LED drivers shall be UL recognized Class 2 per UL1310 or non-Class 2 per UL 1012 as applicable.

F. All LED drivers shall comply with applicable requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 15, for Non-Consumer Equipment.

G. All LED drivers shall be RoHS compliant.

H. TM-21

I. LM-80

J. LM-79

K. L70

L. DLC

M. UL 1008

1.3 ACCEPTABLE MANUFACTURERS

A. Provide lighting fixtures produced by manufacturers as shown and scheduled.

B. LED DRIVER:
   1. Provide one of the following manufacturers
      a. Eldo
      b. Lutron
      c. Osram

d. Philips

C. LAMPS:
1. Provide one of the following LED Chip manufacturers
a. Cree
b. Nichia
c. North American Philips
d. Seoul
e. Lumileds

1.4 SUBMITTALS

A. Shop drawings shall include a brochure with a separate cut sheet for each fixture type arranged in alphabetical order with fixture and all accessories/options clearly labeled. Provide performance data for each fixture. Provide an independent test lab report for each fixture if requested by the Architect/Engineer.

B. Provide driver and LED module data brochures for each fixture type.

C. Provide air handling and heat removal data for light fixtures specified with these requirements.

1.5 REQUIREMENTS OF REGULATORY AGENCIES

A. WORK IN ACCORDANCE WITH:
1. National Electrical Code.
2. Local, municipal, or state codes that have jurisdiction.
3. UL fire resistance directory.

PART 2 - PRODUCTS

2.1 MATERIALS AND COMPONENTS

A. General:
1. Provide the size, type and rating of each light fixture shown and scheduled. All light fixtures shall complete with reflectors, lens, trim rings, flanges, LED modules, lamp holders, drivers, fuses, wiring, earthquake clips, etc. to provide a complete functioning light fixture.

B. Lighting Fixture Types:
1. LED Fixtures
a. Fixtures shall be pre-wired with frame-in kit and integral thermal management system for fixtures. Driver shall be encased in metal-can construction for optimal thermal performance.
b. Total fixture lumen output is dependent on the chip, thermal management, driver current and optical system. LED fixtures shall be tested as a complete unit or system. Only DOE recognized CALiPER testing laboratory results shall be utilized.
c. Interior LED fixtures shall have integral common mode and differential mode surge protection of 3kV(1.2/50µs, 2 ohm combination wave).
d. Exterior LED fixtures shall have integral common mode and differential mode surge protection of 10kV/10kA(1.2/50µs, 2 ohm combination wave).
2. Exit signs
a. Exit signs shall meet all federal, state and local codes.
b. Provide fire alarm interface relay when required to flash exit signs.

c. Provide battery packs for emergency operation when not connected to emergency generator power.

2.2 LED MODULES AND DRIVERS - COORDINATE WITH LIGHT FIXTURE SCHEDULE

A. LED
1. Driver manufacturer shall have a 10-year history producing electronic drivers for the North American market.
2. Driver shall carry a five year limited warranty from date of manufacture against defects in material or workmanship (including replacement) for operation at a maximum case temperature of 176 degrees Fahrenheit.
3. Drivers shall not contain any Polychlorinated Biphenyl (PCB).
4. Provide driver with integral color-coded leads.
5. Driver shall operate from 50/60 Hz input source of 120 Volt through 277 Volt or 347 Volt through 480 Volt with sustained variations of +/- 10% (voltage) with no damage to the driver.
6. Driver output shall be regulated to +/- 5% across published load range. And shall have a power factor greater than .90 for primary application to 50% of full load rating with an input current Total Harmonic Distortion (THD) of less than 20% to 50% of full load rating.
7. Provide drivers with a Class A sound rating.
8. Provide LED drivers for outdoor fixtures with a minimum operating temperature of -40 degrees Fahrenheit. Provide LED drivers for indoor fixtures with a minimum operating temperature of -24 degrees Fahrenheit.
9. Drivers shall tolerate sustained open circuit and short circuit output conditions without fail and auto-resetting without need for external fuses or trip devices.
10. Driver output ripple current shall be less than 15% measured peak-to-average, with ripple frequency being greater than 100Hz.
11. Driver performance requirements shall be met when operated to 50% of full load rating.
12. Driver shall have integral thermal foldback to reduce driver power above rated case temperature to protect the driver if temperatures reach unacceptable levels.
13. Drivers shall comply with NEMA 410 for in-rush current limits.
14. Dimmable drivers shall be controlled by a Class 2 low voltage 0-10VDC controller with dimming range controlled between 1 and 8VDC with source current 150µA.

2.3 LAMPS – COORDINATE WITH LIGHT FIXTURE SCHEDULE

A. LED Lamps shall be appropriately matched to the driver with junction-down design for improved thermal management. Maximum DC Forward Current.

2.4 EMERGENCY LED BATTERY BACKUP

A. Provide Bodine #BSL310M for emergency light fixtures in 9 or 10-foot ceiling.

B. Provide Bodine #BSL20 for emergency LED driver for emergency light fixtures in ceiling heights greater than 12 feet.

C. Provide Bodine #BSL17-C2 for emergency LED driver for LED downlights.

D. Provide unswitched hot leg. Hot leg shall originate from the same branch circuit as required in NEC article 700.12 (F).

2.5 EXIT SIGNS

A. All exit signs shall be Vandal Resistant rated. Exit signs specified on fixture schedule are Basis of design for aesthetics purposes only.

B. All exit signs shall be circuited to an unswitched hot conductors originating from the same circuit as that service other lighting in the same space

C. Provide with wire-guard in Gymnasiums

2.6 BRANCH CIRCUIT EMERGENCY TRANSFER SWITCH (BCELTS)

A. Provide 20 amp, 120-277 Volt, UL1008 listed Branch Circuit Emergency Transfer Switch to control emergency light fixtures transferring from normal to emergency branch circuits Provide Bodine GTD 20A or ETC SC 1008 UL 924 Devices are not acceptable

2.7 AUTOMATIC LOAD CONTROL RELAY (ALCR)

A. Provide 3 amp, 120-277 volt UL 924 listed. Relay to bypass switching controlling emergency branch circuit light fixtures Provide Bodine GTD or Wattstopper ELCU.

PART 3 - EXECUTION

3.1 INSTALLATIONS

A. General
   1. Install the type of lighting fixture where shown and indicated in accordance with manufacturer's written instructions.
   2. Provide earthquake clips on all recessed lay-in lighting fixtures as required by building code.
   3. Adjust all adjustable lighting fixtures, as directed by the Architect.
   4. Provide safety chains and wire guards for lighting fixtures located in gymnasium, multi-purpose rooms, play areas, etc.
   5. All troffers recessed in suspended ceilings shall be furnished with secondary two (2) support cables per fixture, including 2x4, 2x2, 1x4, 1x2, or recessed linear fixtures at a every single fabricated 'section' of continuous fixtures.
   6. All fixtures shall be relocated at to 6-feet in any direction at the request of the owner or architect at no additional cost.

B. Coordination
   1. The contractor shall verify the type of fixtures with the ceiling types as indicated on the drawings. Any discrepancies shall immediately be brought to the architect's attention before the contractor places his order and accepts delivery. Fixtures shall fit exact in the type of ceiling scheduled. Provide plaster frames, trim rings and other accessories required for a correct fit.
   2. Provide supports attached to structural member to support fixtures when the ceiling system cannot maintain support. Provide separate supports for all recessed ceiling mounted HID fixtures.
   3. Refer to architectural reflected ceiling plan for the exact location of all lighting fixtures. Notify the architect for any discrepancies or conflicts with structural, architectural, mechanical piping or ductwork before installation.

C. Mounting
   1. Provide support channels to support outlet boxes used support surface mounted lighting fixtures such as exit signs or downlights.
   2. Pendant or surface mounted fixture shall be provided with required mounting devices and accessories, including hickeys and stud-extensions, ball-aligners, canopies and stems. Locations of fixtures in mechanical areas shall be coordinated with mechanical contractor. Mounting stems of pendant fixtures shall be of the correct length to uniformly maintain the fixture heights shown on the drawings or established in the field. The allowable variation tolerance in mounting individual fixtures shall not exceed 1/4 inch and shall not vary more than 1/2 inch from the floor mounting height shown on the Drawings. Fixtures hung in continuous runs shall be installed absolutely level and in line with each other. Hanging devices shall comply with Code requirements. Fixtures shall employ single - not twin - stem hangers unless otherwise noted.
   3. All structure mounted fixtures (i.e. bracket mounted, pipe mounted and surface mounted) shall be provided with cables of suitable size and weight to support the weight of the fixture. Cables shall be fastened around or fastened to the housing of the fixture. On pendant fixtures, one safety cable of suitable size and weight to support the weight of the fixture assembly shall connect the top of the pendant to the supporting structure by means of welding or bolting, and one safety cable shall connect the housing of the fixture to the bottom of the pendant. Where more than one pendant per fixture occurs, only one pendant must be cabled. Track fixtures for pendant mounted track shall also be supplied with clip-on safety cables of suitable size and weight to support the weight of the fixture.
   4. Provide secondary support wires from all four (4) corners of the lay-in fixtures to the structure above. Do not support fixtures from ceiling grid wire supports, piping, conduit, side walls, or mechanical equipment. Ceiling specifications do not supersede this requirement.
   5. Where pole mounted luminaries are provided, provide appropriate anchor base pole as specified with manufacturer’s recommended anchor bolts. Verify exact location on site for poles with Architect, Civil, and Landscape documents. Poles shall be installed on proper footing. Refer to details on the drawings. Provide grounding connection to a separately driven ground rod, outside of the footing. Where indicated provide pole with identification plate indicating pole number.

D. Electrical Connection
   1. All light fixtures shall be connected from a branch circuit junction box using 1/2" flexible metal conduit or MC cable fixture pigtails not exceeding 8'- 0". Provide #12 AWG conductors. All fixtures must be grounded by using a grounding conductor. Fixture to fixture wiring of fixtures installed in an accessible ceiling is not permitted. Fixture whips shall not lay-on ceiling tile or grid. Provide caddy clips to provide additional support.

E. Fire Rated Ceiling
   1. Provide fire rated canopy or enclosure for all fixtures recessed in a fire rated ceiling. The fire rated canopy or enclosure shall be as required by the UL design number listed in the UL fire resistance directory. Refer to architectural drawing for the UL design number. Coordinate with ceiling installer and manufacturer. Provide proper rated drivers for lighting fixtures installed within these rated enclosures.

F. Air Handling Fixtures

1. Install all air handling light fixtures with return air slot in the open position, if it is to be as an air handling fixture. Coordinate with mechanical contractor.

3.2 FINAL INSPECTION

A. Remove all plastic and protective coating from all fixtures. Fixtures shall be thoroughly cleaned. Replace any damaged fixture or fixture parts including reflectors, louvers, lens and metal parts that show signs of corrosion.

B. Replace all other defective fixtures showing signs of excessive usage.

C. Demonstrate proper operation of all fixtures and controls. Refer to other sections and details on the drawings for lighting controls.

3.3 WARRANTY

A. in addition to other warranties required within these specifications, all battery packs, regardless of their application, shall maintain a minimum 5-year replacement warranty.

END OF SECTION 26 51 19

SECTION 27 00 00 - BASIC MATERIALS AND METHODS

PART 1 – GENERAL

1.01 RELATED WORK

A. The entire drawing and specification package apply to the work specified in the telecommunications sections of the specifications and shall be complied with in every respect. The Contract Documents are comprised of the drawings and specifications. The Contractor shall examine these Contract Documents, and coordinate required work indicated in each.

1.02 SCOPE OF WORK

A. The work covered by the specifications includes furnishing materials, labor, transportation, tools, permits, fees, utilities, and incidentals necessary for the complete installation of work required in the Contract Drawings.

B. It is the intent of the Contract Documents to provide an extension of the existing installed systems interfaced with new systems, complete in every respect.

C. The Contractor shall be responsible for coordination and proper relation of his work to the building structure and to the work of all trades. The Contractor shall visit the premises and thoroughly familiarize himself with the existing site conditions, details of the work and the working conditions, and verify dimensions in the field. The Contractor shall advise the Engineer of any discrepancy prior to bidding. The submission of bids shall be deemed evidence of the Contractor's site visit; coordination of existing conditions and include consideration for existing conditions.

D. Provide line-by-line specification review for each Division 27 section annotated to certify compliance or deviation.

1.03 DRAWINGS AND SPECIFICATIONS

A. The drawings and these specifications are complementary to each other, and what is required by one shall be as binding as if required by both.

B. If variations or departures from the drawings are deemed necessary by the Contractor, details of such departures and the reasons therefore shall be submitted to the Engineer for review. No departures shall be made without prior written acceptance of the Engineer.

C. Should the drawings or specifications disagree in themselves or with their counterpart, the better quality or greater quantity of work or materials shall be estimated upon, and unless otherwise directed by the Engineer in writing, shall be performed or furnished. In case the specifications should not fully agree with the Schedules, the latter shall govern. Figures indicated on drawings govern scale measurements and large scale details govern small scale drawings.

D. Items specifically mentioned in the specifications but not shown on the drawings and/or items shown on the drawings but not specifically mentioned in the specifications shall be installed by the Contractor under the appropriate section of work as if they were both specified and shown.

1.04 CODES AND STANDARDS

A. All work shall comply with the applicable articles of the National Electrical Code, the National Electrical Safety Code, the National Fire Codes (published by National Fire Protection Association), and City Codes and Ordinances, as well as any other authorities that may have lawful jurisdiction pertaining to the work specified. None of the terms or provisions of this specification shall be construed as waiving any of the rules, regulations, or requirements of these authorities.

B. Contractor is responsible for knowledge and application of current versions of all applicable standards and codes. In cases where listed standards and codes have been updated, Contractor shall adhere to the most recent revisions, including all relevant changes or addenda at the time of installation.

C. ANSI/TIA:
1. ANSI/TIA-526-7-A (July 2015) Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
2. TIA-526.2-A (July 2015) Effective Transmitter Output Power Coupled into Single-Mode Fiber Optic Cable - Adoption of IEC 61280-1-1 ed. 2 Part 1-1: Test Procedures for General Communication Subsystems – Transmitter Output Optical Power Measurement for Single-Mode Optical Fiber Cable
3. ANSI/TIA-4994 (March 2015) Standard for Sustainable Information Communications Technology
4. ANSI/TIA-526-14-C (April 2015) Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
5. ANSI/TIA-568.0-D (September 2015) Generic B (supersedes TIA-568-C.0 and TIA-568-C-1)
6. ANSI/TIA-568.1-D (September 2015) Commercial Building Telecommunications Infrastructure Standard (supersedes ANSI/TIA-C.1)ANSI/TIA-568.2-D (September 2018) Balanced Twisted-Pair Telecommunications Cabling and Components Standard
7. ANSI/TIA-568.3-D (June 2016) Optical Fiber Cabling Components Standard
8. ANSI/TIA-568.4-D (August 2020) Broadband Coaxial Cabling Components Standard
9. ANSI/TIA-569-E (May 2019) Telecommunications Pathways and Spaces
10. ANSI/TIA-598-D (July 2014) Optical Fiber Cable Color Coding
11. ANSI/TIA-570-C (August 2012) Residential Telecommunications Infrastructure Standard
12. ANSI/TIA-606-C (June 2017) Administration Standard for Telecommunications Infrastructure
13. ANSI/TIA-607-D (July 2019) Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises
14. ANSI/TIA-758-B (March 2012) Customer-Owned Outside Plant Telecommunication Infrastructure Standard
15. ANSI/TIA-862-B (February 2016) Structured Cabling Infrastructure Standard for Intelligent Building Systems
16. ANSI/TIA-942-B (July 2017) Telecommunications Infrastructure Standard for Data Centers
17. ANSI/TIA-1005-A (May 2012) Telecommunications Infrastructure Standard for Industrial Premises
18. ANSI/TIA-1005-A-1 (January 2015) Telecommunications Infrastructure Standard for Industrial Premises, Addendum 1- M12-8 X-Coding Connector - Addendum to TIA-1005-A
19. ANSI/TIA-1183 (August 2012) Measurement Methods and Test Fixtures for Balun-Less Measurements of Balanced Components and Systems
20. ANSI/TIA-1183-1 (January 2016) Measurement Methods and Test Fixtures for Balun-Less Measurements of Balanced Components and Systems, Extending Frequency Capabilities to 2 GHz - Addendum to TIA-1183

21. TIA-1152 (November 2016) Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
22. TIA-1179-A (September 2017) Healthcare Facility Telecommunications Infrastructure Standard
23. ANSI/TIA-4966 (May 2014) Telecommunications Infrastructure Standard for Educational Facilities
24. TIA-455-104-B (February 2016) FOTP 104- Fiber Optic Cable Cyclic Flexing Test (supersedes TIA-455-104-A)
25. TIA/EIA-455-25-D (February 2016) FOTP-25 Impact Testing of Optical Fiber Cables
26. TIA-604-18 (November 2015) FOCIS 18 Fiber Optic Connector Intermateability Standard – Type MPO-16
27. TIA-604-5-E (November 2015) FOCIS 5 Fiber Optic Connector Intermateability Standard- Type MPO
28. TIA-5017 (March 2016) Telecommunications Physical Network Security Standard
29. TIA-TSB-155-A (Reaffirmed 10-6-2014) Guidelines for the Assessment and Mitigation of Installed Category 6 Cabling to Support 10GBASE-T
30. TSB-184 (July 2009) Guidelines for Supporting Power Delivery Over Balanced Twisted-Pair Cabling
31. TSB-4979 (August 2013) Practical Considerations for Implementation of Multimode Launch Conditions in the Field
32. TSB-190 (June 2011) Guidelines on Shared Pathways and Shared Sheaths
33. TIA-TSB-162-A (November 2013) Telecommunications Cabling Guidelines for Wireless Access Points
34. TSB-5018 (July 2016) Structured Cabling Infrastructure Guidelines to support Distributed Antenna Systems
35. TIA-492AAAE (June 2016) Detail Specification for 50-µm Core Diameter/125-µm Cladding Diameter Class 1a Graded-Index Multimode Optical Fibers with Laser-Optimized Bandwidth Characteristics Specified for Wavelength Division Multiplexing
36. TIA-492AAAB-A (November 2009) Detail specification for 50-µm core diameter/125-µm cladding diameter class Ia graded-index multimode optical fibers
37. TIA-455-243 (March 2010) FOTP-243 Polarization-mode Dispersion Measurement for Installed Single-mode Optical Fibers by Wavelength-scanning OTDR and States-of-Polarization Analysis
38. TSB-172-A (February 2013) Higher Data Rate Multimode Fiber Transmission Techniques

D. ISO/IEC:
1. ISO/IEC TR 11801-99-01 Information technology – Generic cabling for customer premises: Guidance for balanced cabling in support of at least 40 GBit/s data transmission: Parts 1 and 2
2. ISO/IEC TR 29106 AMD 1 Information technology -- Generic cabling -- Introduction to the MICE environmental classification
3. ISO/IEC 24764 AMD 1 Information technology – Generic cabling for data centers
4. ISO/IEC 11801 AMD 1 AMD 2 Information technology – Generic cabling for customer premises
5. ISO/IEC 15018 AMD 1 Information technology – Generic cabling for homes
6. ISO/IEC 24702 AMD 1 Information technology – Generic cabling – Industrial premises
7. ISO/IEC 14763-1 AMD 1 Information technology – Implementation and operation of customer premises cabling – Part 1: Administration
8. ISO/IEC 14763-2 Information technology – Implementation and operation of customer premises cabling – Part 2: Planning and installation
9. ISO/IEC 14763-2-1 Information technology – Implementation and operation of customer premises cabling – Part 2-1: Planning and installation – Identifiers within administration systems
10. ISO/IEC 14763-3 Ed 2.0 Information technology -- Implementation and operation of

customer premises cabling -- Part 3: Testing of optical fiber cabling
11. ISO/IEC TR 24704 Information technology – Customer premises cabling for wireless access points
12. ISO/IEC TR 24750 Information technology – Assessment and mitigation of installed balanced cabling channels in order to support 10GBASE-T
13. ISO/IEC TR 29125 IT Telecommunications cabling requirements for remote powering of terminal equipment

E. BICSI – Building Industry Consultative Services International – Published Standards
1. ANSI/BICSI 001-2009, Information Transport Systems Design Standard for K-12 Educational Institutions
2. ANSI/BICSI 002-2014, Data Center Design and Implementation Best Practices
3. ANSI/BICSI-003-2014 Building Information Modeling (BIM) Practices for Information Technology Systems
4. BICSI 004-2012, Information Technology Division Systems Design and Implementation Best Practices for Healthcare Institutions and Facilities
5. ANSI/BICSI 005-2016, Electronic Safety and Security (ESS) System Design and Implementation Best Practices
6. BICSI 006-2015 Distributed Antenna System (DAS) Design and Implementation Best Practices
7. ANSI/NECA/BICSI 568-2006, Standard for Installing Commercial Building Telecommunications Cabling
8. NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
9. BICSI – Building Industry Consultative Services International – Manuals
10. Telecommunications Distribution Methods Manual, 14th Edition (2020)
11. Information Transport Systems Installation Methods Manual (ITSIMM), 6th Edition
12. Outside Plant Design Reference Manual, 5th Edition
13. BICSI's ICT Terminology Handbook, Version 1.0
14. Telecommunications Project Management Manual (TPMM), 1st edition
15. Telecommunications Project Management Reference Document (TPMRD), 2nd Edition
16. BICSI's Special ICT Design Considerations, Version 1.0
17. Essentials of Bonding and Grounding, Version 1.0

F. National Electric Codes
1. National Electrical Safety Code (NESC) (IEEE C2-2012)
2. NFPA 70-2020, National Electrical Code© (NEC©)
3. ANSI/IEEE C2-207, National Electrical Safety Code®
4. National Electrical Code (NEC) (NFPA 70)
5. NFPA 72 National Fire Alarm and Signaling Code

G. ASHRAE
1. ASHRAE Standard 90.4P, Energy Standard for Data Centers and Telecommunications Buildings

H. OSHA Standards and Regulations – all applicable

I. Local Codes and Standards – all applicable

J. Anywhere cabling standards conflict with one another or with electrical or safety codes, Contractor shall defer to the NEC and any applicable local codes or ordinances, or default to the most stringent requirements listed by either.

K. Knowledge and execution of applicable standards and codes is the sole responsibility of the

Contractor.

L. Any violations of applicable standards or codes committed by the Contractor shall be remedied at the Contractor's expense.

M. In any instance where these Specifications call for materials for construction of a better quality or larger size than required by the codes, the provisions of these Specifications shall take precedence. The codes shall govern in case of direct conflict between the Codes and the Drawings.

1.05 EXISTING UTILITIES

A. The Contract Documents reflect the general location and routing for all telecommunications services known to exist on this project.

1.06 BUILDING CONSTRUCTION AND LAYOUT OF WORK

A. General: It shall be the responsibility of the Contractor to consult the Engineering Drawings and Details so as to thoroughly familiarize himself with the type and quality of construction to be provided on this project.

B. The drawings are diagrammatic in nature and do not show every connection in detail or every line or conduit in its exact location. These details are subject to the requirements of all codes and ordinances as well as all structural and architectural conditions. The Contractor shall carefully investigate structural and finish conditions and shall coordinate the separate trades in order to avoid interference between the various phases of work. Work shall be laid out so that it will be concealed in furred chases unless specifically noted or indicated to be exposed. Work shall be installed to avoid crippling of structural members; therefore, inserts to accommodate conduit hangers shall be set before concrete is poured, and proper openings through floors, walls, beams, etc. shall be provided as hereinafter specified or as otherwise indicated or required before concrete is poured. All work shall be run parallel or perpendicular to the lines of the building unless otherwise noted.

C. The approximate location of equipment items is indicated on the drawings. Exact locations are to be determined by coordination of dimensions from approved equipment submittals and site-verified field measurements and will in all cases be subject to the approval of the Engineer. The Engineer reserves the right to make any reasonable changes in the indicated locations prior to installation for no additional cost.

D. In areas of existing special ceiling construction the removal and restoration must be carefully planned such that the existing condition of the ceilings is maintained. It may be necessary for the Contractor to procure a Subcontractor familiar with this work to achieve this requirement.

PART 2 – PRODUCTS

2.01 GENERAL MATERIALS AND EQUIPMENT REQUIREMENTS

A. Materials, in general, shall conform to the National Electrical Code requirements and shall be listed, inspected, and approved by the Underwriters Laboratories and shall bear the UL label where labeling service is available. The label or listing of the Underwriters Laboratories, Inc. will be accepted as evidence that the materials or equipment conform to the applicable standards of that agency. In lieu of this listing, the Contractor may submit a statement from a nationally recognized, adequately equipped testing agency,

indicating that the items have been tested in accordance with required procedures, and that the materials and equipment comply with all Contract requirements.

2.02 STANDARD PRODUCTS

A. Materials and equipment shall be the standard catalog products of manufacturers regularly engaged in the manufacture of products conforming to these specifications, and shall essentially duplicate materials and equipment that have been in satisfactory use at least two (2) years prior to bid opening. Where custom or special items are required, these shall be fully described using drawings, material lists, etc., which fully describe in detail the item proposed for use on this project.

2.03 MANUFACTURER'S INSTRUCTIONS

A. The Contractor is responsible for furnishing the proper telecommunications equipment and/or material and for seeing it is installed as intended by the manufacturer. The Contractor shall, wherever necessary, request advice and supervisory assistance from equipment manufacturers as required for the proper installation, operation, or start-up. The Contractor shall notify the Engineer in writing of any conflict between the Contract Documents and the manufacturer's recommendations and shall obtain from the Engineer instructions/direction before proceeding with the work. The Contractor shall pay for all costs resulting from deficiencies created by installation not in accordance with the manufacturer's recommendations or the instructions of the Engineer.

2.04 RUST PREVENTION

A. Metallic materials shall be protected against corrosion. Exposed metallic parts of equipment exposed to the elements shall be given a rust inhibiting treatment and standard finish by the manufacturer. Components such as boxes, bodies, fittings, guards, and miscellaneous parts shall be protected in accordance with the ASTM A123 or A153, except where other equivalent protective treatment is specifically approved in writing.

2.05 STORAGE AT SITE

A. The Contractor shall not receive material or equipment at the job site until ready for installation or until there is suitable space provided to properly protect equipment from rust, weather, humidity, dust, or physical damage.

2.06 CONDITION OF MATERIALS

A. All materials required for the installation of the telecommunications systems shall be new and unused. Any material or equipment damaged in transit from the factory, during delivery to premises, while in storage on premises, while being erected and installed, or while being tested, until time of final acceptance, shall be replaced by this Contractor without extra cost to Owner.

2.07 NAMEPLATES

A. Factory assembled components and equipment shall be provided with embossed nameplates, securely attached to the equipment with rivets or screws. Nameplates will have information required to specifically identify the equipment in the future such as the manufacturer's name, address, catalog number, serial number, etc. All data on nameplates shall be legible at the time of final inspection.

PART 3 – EXECUTION

3.01 ACCEPTABLE MANUFACTURERS

A. The specifications contain the names of manufacturers which are considered acceptable based on the quality of the product.

B. Where acceptable manufacturers are listed, only products of those manufacturers may be provided. Additionally, the product must meet all the detailed requirements of the specifications.

C. If no manufacturer's name is mentioned, the Contractor shall provide equipment and material which meet the specifications.

D. The drawings represent the manufacturer's equipment scheduled. The listing of acceptable manufacturers in the specifications is not intended to imply that equipment of these other manufacturers will fit in the space provided or have the same electrical, structural or other requirements as the equipment scheduled. The Contractor must ensure that the equipment provided will meet all project requirements prior to submitting data on that equipment.

3.02 SPACE AND EQUIPMENT ARRANGEMENT

A. Equipment and components shall be installed in a manner to permit access to parts requiring service. Telecommunications equipment shall be installed in such a manner as to allow removal for service without disassembly of adjacent equipment.

B. Large equipment or apparatus which is to be installed in the building, and which is too large to permit access through stairways, doorways, or shafts shall be brought to the job and placed in the space before the enclosing structure is completed. Following placement in the space, such apparatus shall be thoroughly protected from damage.

C. Equipment shall have working clearances as required by applicable codes and standards.

3.03 SUBMITTAL AND REVIEW OF MATERIALS

A. After the Contract is awarded, but prior to proceeding with the Work, the Contractor shall obtain, check, certify, and submit complete Shop Drawings and Brochures from Manufacturers, Suppliers, Vendors, etc., for all materials and equipment specified herein. Submit Shop Drawings and Brochures in sufficient time so as not to impede the progress of work. Three weeks will be required for the processing of Shop Drawings and Brochures in the Engineer's office, exclusive of transmittal time. This time shall be considered by the Contractor when scheduling submittal data. After the Contract is awarded, the Contractor will advise the Engineer in writing of the schedule for submission of shop drawings and product data and the persons authorized to sign submittal data on behalf of the Company.

B. The Engineer's review of Shop Drawings and Brochures shall not relieve the Contractor of the responsibility for dimensions, errors that may be contained therein, or deviations from Contract Document requirements. It shall be clearly understood that the Engineer's noting some errors but overlooking others does not grant the Contractor permission to proceed in error. Regardless of any information contained in the Shop Drawings, the requirements of the Contract Documents shall govern and are not waived or superseded in any way by the submittal data review.

C. Before submission of Shop Drawings and Brochures, the Contractor shall certify that each

Shop Drawing and each item of material or equipment complies with the Contract Documents for this Project. Such certification shall be made by the Owner, a Partner, a Corporate Officer of the Contractor, or by a person duly authorized to sign for the Contractor. Unless so certified, Shop Drawings and/or Brochures will be returned for resubmittal. Certifications shall be in the form of rubber stamp impressions or typed letter which states:

I hereby certify that this Shop Drawing and/or brochure and the equipment and material shown on this Shop Drawing and/or Brochure complies in all aspects (except as noted*) with the requirements of the Contract Documents for this Project. I further certify that all data shown herein as to performance, dimensions, construction, materials, and other pertinent items are true and correct.

Name of Contractor_____

Signed_____

Position_____

Date_____

*Refer to exception requirements herein.

D. Each Shop Drawing shall indicate in the lower right hand corner and each Brochure shall indicate on the front cover the following: Title of the Sheet or Brochure; name and location of the building; names of the Engineer, Contractor, Manufacturer, Supplier, Vendor, etc., the date of submittal; and the date of each correction and revision. So far as is practical, each Shop Drawing and/or Brochure shall bear a cross-reference note to the sheet number or numbers of the Contract Drawings and Specifications showing the same work. Shop Drawings and Brochures shall be prepared as follows:

1. Shop Drawings: Drawings shall be newly prepared and not reproduced from the Contract Documents, drawn to a scale that can be easily read and shall contain sufficient plans, elevations, sections, and isometrics to describe clearly the items in question. Drawings shall be prepared by a draftsman skilled in this type of work. All equipment layouts and similar Shop Drawings shall be drawn to at least 1/4-inch = 1'-0" scale.

2. All Shop Drawings shall indicate the equipment actually purchased. The elevation, location, support points, load imposed on the structure at support and anchor points, shall be indicated. All beam penetrations and slab penetrations shall be indicated and sized and shall be coordinated. All Design Drawing space allocations shall be maintained, such as ceiling height, chase walls, equipment room size, etc., unless proper written authorization is required from the Engineer to change them. All associated equipment shall be coordinated and clearly shown on the Shop Drawings.

3. Brochures: Brochures submitted to the Engineer shall be published by the Manufacturers and shall contain complete and detailed engineering and dimensional information to show that the equipment will fit into the allotted space.

4. Brochures submitted shall contain only information which is relevant to the particular equipment or materials to be furnished. Do not submit catalogs that describe several different items other than those items to be used unless all irrelevant information is marked out or relevant information is clearly marked.

E. The submittal format shall follow the Specifications format with a submittal required for each required section. The submittal shall be contained in a three-ring hard back binder. Copies of each submittal shall be three-hole punched and arranged (or folded if required) for the Engineer's filing convenience. Provide one copy of updated TABLE OF CONTENTS and progressive-tabbed index sheets also for the Engineer's filing convenience.

F. Submittal data for each section must be complete. Partial submittals will not be reviewed. To the greatest extent possible all sections shall be submitted with the first submission. No more than three additional submissions will be allowed to complete the submittal package.

G. Unless a greater number is indicated within Division One of these specifications, submit six (6) copies of all Brochures for review. Submit one (1) reproducible and one (1) blueprint of shop drawings for review. Comments will be made on the reproducible to facilitate copying.

H. Any submittal that is disapproved must be resubmitted within two (2) weeks following notification of such disapproval. If no satisfactory material is submitted within the two-week period, the Engineer reserves the right to require the Contractor to furnish items exactly as described in the Contract Documents.

I. No allowances will be made for submittals which are not made in a timely fashion or which are turned down because they do not meet the specifications. Should delivery problems arise due to the above, affecting the completion time of the project, the Contractor will furnish and install acceptable alternates until the proper materials arrive and then replace the alternate materials with the approved materials, all at no cost to the Owner. If the Contractor is not able to furnish an acceptable alternate until the proper materials arrive, he will assume all costs for furnishing and installing all alternates as directed by the Engineer and/or will pay a suitable penalty for the inconvenience experienced by the Owner. This penalty will be set by the Owner based on the particular circumstances.

3.04 SUPERVISION

A. A competent certified foreman or superintendent, approved by the Engineer, shall be maintained at the project site to receive instructions and to act for the Contractor. Once this superintendent has been approved, no change shall be made without approval of the Owner or his authorized representative. The Owner and his authorized representative shall have the right to observe the work at any time. The Contractor shall have a representative present when his work is being observed, and he shall give assistance as required.

3.05 CUTTING AND PATCHING

A. Where it is necessary to cut through walls, floors, or ceilings to permit installation of work under this section of the Contract, or to repair any defects that may appear, up to the expiration of guarantee period, such cutting shall be done under the supervision of the Engineer. The Contractor shall not be permitted to cut or modify any structural members without the written permission of the Engineer.

B. Patching of all openings and repairing of any damage to the work of other trades occasioned by cutting operations, or occasioned by the failure of any part of work installed under this Contract, shall be performed by the trade whose work is involved, and shall be paid for by the Contractor.

C. Openings cut through exterior walls or roofs shall be provided with suitable covers to protect the property or materials involved. Openings cut through walls below grade shall be properly protected to prevent entrance of water or other foreign elements. Openings cut between fire

zones or plenums shall be sealed to maintain the fire integrity of the wall or floor. Conduits and cable tray through plenum wall shall be sealed using materials complying with UL 1479, NEC 300-21, and NEC 800-3(C), and shall be UL classified.

3.06 HOISTING, SCAFFOLDING, AND TRANSPORTATION

A. Provide hoisting and scaffolding facilities as required to set materials and equipment in place.

3.07 CLEANING

A. The Contractor shall at all times keep the premises free from accumulations of waste material or rubbish. Debris shall be removed from the site and from any street or alley adjacent to the site.

B. At completion of the project, the Contractor shall remove all tools, scaffolding, and surplus materials. Contractor shall leave the area "broom clean". Before final acceptance, vacuum all panels, cabinets, racks and other equipment enclosures. Wipe clean all fixture lenses and reflectors, all panelboard and switchboard interior and exterior surfaces, being careful to remove all stray paint, construction materials, dust, and particles. Touch-up all marred surfaces to restore existing conditions to those provided by the manufacturer.

3.08 CONDUIT SLEEVES

A. Where conduits pass through walls or floors not on fill, galvanized sheet metal sleeves shall be provided and shall be sealed to prevent air and noise transmission. In walls, they shall be flush with each finished surface. In pipe chases, they shall extend 1-1/2 inches above floor slab and be cemented in a water tight manner. Size of these sleeves shall be at least 1/2 inch greater than outside diameter of the conduit.

B. For conduits passing through outside walls, provide and install galvanized steel sleeves having an inside diameter at least 4 inches greater than the outside diameter of contained conduit. Where these occur in walls having a waterproof coating applied, the sleeves shall have welded flanges to build into waterproofing. When conduits are installed, the annular space between pipe and sleeve shall be effectively sealed, using shredded lead hammered in place or an approved mastic sealer.

C. Pipe and duct sleeves, pitch pockets, and flashings compatible with the roofing installation shall be provided for roof penetrations.

3.09 GROUNDING

A. Ground buses shall be provided in each Telecommunications room by Division 16 Contractor unless noted on Contract Drawings.

B. Telecommunications grounding system shall be a single point grounding from the building entrance electrical ground to each Telecommunications room. This Grounding system shall be provided by Division 16 Contractor unless notes on Contract Drawings.

C. All Conduit systems, cabinets' racks, cable trays, protector blocks, SCTP patch panels and/or miscellaneous equipment, etc. shall be grounded by being connected to the common telecommunications grounding system. The conductors shall be a # 6awg solid with a green jacket

3.10 RECEDENCE OF WORK

1. This Contract includes many different systems furnished and installed by different trades. All trades shall coordinate their work with that of all other trades so that it may be installed in the most direct and workmanlike manner without hindering or handicapping other trades.

3.11 RECORD DRAWINGS

A. The Contractor shall keep a set of Drawings on the job, noting daily all changes made in these Drawings in connection with the final installation, including exact dimensioned locations of all new and uncovered existing active and inactive utilities outside the building, and shall turn over a clean, neatly marked set of mylar reproducible Drawings showing "as-installed" work to the Engineer for delivery to the Owner. All underground utilities, services, and systems shall be accurately located by the Contractor and dimensioned on the "as-installed" Drawings.

3.12 OPERATING AND MAINTENANCE MANUAL

A. The Contractor shall furnish indexed operating and maintenance manuals with complete technical data for each system, piece of equipment, and material installed under this Contract.

B. Two (2) copies of the manual, bound in hardback binders or an approved equivalent, shall be provided. One copy shall be completed and delivered to the Engineer prior to the time that system and equipment tests are performed. The second copy shall be delivered prior to final acceptance.
   1. Provide one (1) operation and Maintenance manual for each building. Provide one (1) as-built floor plan and one CD for each building.

C. The manual shall include the following information
   1. Manufacturer's installation instructions.
   2. Manufacturer's local representative and/or distributor's name and address.
   3. Manufacturer's operating and maintenance instructions.
   4. Manufacturer's internal wiring diagrams.
   5. Contractor's installation wiring diagrams.
   6. Replacement part number listings and descriptions.
   7. Framed operating instructions, when required, in individual Specification sections.
   8. Warranties and guarantees.
   9. Provide an approved submittal at the front of each section.

D. The manuals shall be identified on the cover as "Operating and Maintenance Manual" with additional cover display of the name and location of project, the Owner, the Engineers, the General Contractor, and the Subcontractors installing equipment represented in the brochure.

E. The manual shall have a Table of Contents and shall be grouped in sections according to the sections of Division 27. Each section shall have a copy of the pages of the Specifications covered within the section. Sections shall be organized as follows:
   1. Each section in the manual shall identify the grouping of all literature required for the system or equipment included.
   2. The contents of each section shall be arranged in the following sequence: First, the approved engineering submittals with complete performance and technical data; second, the manufacturer's installation brochure; third, the manufacturer's operating and maintenance brochure; fourth, the manufacturer's installation wiring diagram;

fifth, the Contractor's field wiring diagram, if different; and sixth, the manufacturer's brochure listing replacement part numbers and description.

3. Provide a final section entitled, "Warranties and Guarantees", for all equipment, etc.

3.13 EXISTING FACILITIES

1. The Contractor shall be responsible for loss or damage to the existing facilities and shall be responsible for repairing or replacing such loss or damage. The Contractor shall send proper notices and receive written permission from the Owner to enter existing areas. Before beginning work in existing areas, the Contractor shall make necessary arrangements and perform other services required for the care, protection, and in-service maintenance of all electrical, communication, plumbing, heating, air condition, and ventilating services for new and existing facilities. The Contractor shall erect temporary barricades with necessary safety devices to protect personnel from injury, removing all such temporary protection upon completion of the work.

2. The Contractor shall provide temporary or new services to existing facilities as required to maintain their proper operation when normal services are disrupted as a result of the work being accomplished under this project.

3. Where existing construction is removed to provide working and extension access to existing utilities, the Contractor shall remove doors, piping, conduit, outlet boxes, wiring, light fixtures, air condition ductwork, and equipment, etc. to provide this access and shall reinstall same upon completion of work.

4. Where partitions, walls, floors, or ceilings of existing construction are indicated to be removed, the Contractor shall remove and reinstall in locations approved by the Engineer all devices required for the operation of the electrical systems installed in the existing construction. This is to include, but is not limited to, temperature control system devices, electrical switches, relays, fixtures, piping, conduit, etc.

3.14 DEMOLITION AND RELOCATION

1. The Contractor shall modify, remove, and relocate all materials and items so indicated on the drawings or required by the installation of new facilities. All removals and/or dismantling shall be conducted in a manner as to produce maximum salvage. Salvage materials shall remain as directed by the Owner. Materials and items scheduled for relocation and which are damaged during dismantling or reassembly operations shall be repaired and restored to the approval of the Owner. The Contractor may substitute new materials and items of like design and quality in lieu of materials and items to be relocated, if approved by the Owner.

2. All items scheduled for relocation and/or reuse shall be inspected by the Contractor and the Owner or his authorized representative. A written report of the condition of each item shall be made and provided to the Engineer. Where items scheduled for relocation and/or reuse are considered unsuitable for reuse, the Contractor shall so notify the Engineer and await reinstallation instructions before proceeding with removal. Items damaged in reinstallation shall be repaired or replaced by the Contractor as directed by the Owner at not additional cost to the Owner or the Engineer.

3. All items which are to be relocated shall be carefully removed in reverse to original assembly or placement and protected until relocated. The Contractor shall clean, repair, and provide all new materials, fittings, and appurtenances required to complete the relocation and to restore the items to good operative order. All relocations shall be performed by workmen skilled in the work ad in accordance with standard practice of the trades involved.

4. Service lines and wiring to items to be removed, salvaged, or relocated shall be removed to points as indicated on the drawings, specified, or acceptable to the Owner. Service lines and wiring not scheduled for reuse shall be removed to the points at which reuse is to be continued or service is to remain. Such services shall be sealed, capped, or otherwise tied off or connections into the existing facilities in such a manner as to result in minimum interruption of services to adjacent occupied areas. Services to existing areas or facilities which must remain in operation during the construction period shall not be interrupted without prior specific written approval of the Engineer.

3.15 OUTAGES

1. Outages of services as required by the project will be permitted, but only at a time approved by the Owner. The Contractor shall notify the Owner in writing two (2) weeks in advance of the requested outage in order to schedule required outages. No outages shall be taken unless written approval has first been received from the Owner. The time allowed for outages will not be during normal working hours unless otherwise approved by the Owner. All costs of outages, including overtime charges, shall be included in the Contract amount.

END OF SECTION 27 00 00

SECTION 27 05 28 - COMMUNICATIONS BUILDING PATHWAYS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes pathway systems for low voltage cabling and wiring.
B. Related Sections
   1. Comply with related Sections 27 00 00 and 26 05 00.
   2. Section 26 05 26 Grounding and Bonding for Electrical Systems
   3. Section26 05 33 Raceway and Boxes for Electrical Systems

1.2 REFERENCES

A. Comply with the latest edition of the following applicable Specifications and standards except as otherwise indicated or specified:
B. Federal Specifications (FS):
   1. FS WW-C-563: Electrical Metallic Tubing
   2. FS WW-C-566: Specification for Flexible Metal Conduit
C. American National Standards Institute, Inc. (ANSI):
   1. ANSI C80.3: Electrical Metallic Tubing, Zinc Coated
   2. ANSI/NEMA OS-1 Sheet-Steel Outlet Boxes, Device Boxes, Covers and Box Supports
D. Underwriters Laboratories, Inc. (UL):
   1. UL 514B: Conduit, Tubing and Cable Fittings
   2. UL 635: Insulating Bushings
   3. UL 797: Electrical Metallic Tubing – Steel
   4. UL 50: Enclosures for Electrical Equipment
   5. UL 514A: Metallic Outlet Boxes
E. ASTM International:
   1. ASTM A123 – Specifications for Zinc (Hot Galvanized) Coatings on Iron and Steel
   2. ASTM A510 – Specifications for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel
   3. ASTM A525 – General Requirements for Steel Sheet, Zinc-Coated Galvanized by the Hot- Dip Process
   4. ASTM B633 – Specifications for Electrodeposited Coatings of Zinc on Iron and Steel
   5. ASTM A653 – Specifications for Steel Sheet, Zinc-Coated (Galvanized) by Hot Dip Process
   6. ASTM A591 – Specifications for Electrodepositing Coatings of Zinc on steel wire or sheets
F. National Electrical Manufacturer Association (NEMA)
   1. NEMA VE 1 – Cable Tray Systems
   2. NEMA VE 2-2000 – Cable Tray Installation Guidelines

1.3 DEFINITIONS

A. Definitions as described in Section 27 00 00 shall apply to this section.
B. In addition to those Definitions of Section 27 00 00, the following list of terms as used in this specification defined as follows:
   1. “Cable Hanger”: A metal, most often steel, or fabric cable support device often shaped (section view) similar to the letter J. The device is available in different sizes supporting different quantities of cables, and is also available with different attachment hardware to be supported by different methods (e.g., wire support, beam flange clip, etc.).
   2. “Flat Bar”: Custom cable support product manufactured by CEAS, Inc.
   3. “Ladder Cable Tray”: A continuous, rigid, aluminum cable support and

management system. Available in different sizes supporting different quantities of cables.

4. “Wire Basket Cable Tray”: A continuous, rigid, welded steel wire mesh cable support and management system. Available in different sizes supporting different quantities of cables,and is also available with different attachment hardware to be supported by different methods.

1.4 SYSTEM DESCRIPTION

A. Base Bid Work
B. The work under this section shall include the planning and coordination (and other trades) of telecommunications system pathways, the furnishing of necessary materials, and the labor & associated services required to install telecommunications pathways.
C. All pathways should be installed in accordance with the most recent ANSI/TIA, NEC and the BICSI TDMM specifications.
D. The Telecommunications Pathways consist of the following subsystems:
   1. Cable Tray Systems
   2. Cable Hangers
   3. Electrical metallic tubing and fittings.
   4. Miscellaneous conduit fittings and products.
   5. Wall and ceiling outlet boxes.
   6. Pull and junction boxes.

1.5 SUBMITTALS

A. Comply with Submittal procedural, quantity, and format requirements of Section 27 00 00.
B. Submittal Requirements at Start of Construction:
C. Product Data Submittal
D. Shop Drawings Submittal: Consisting of proposed changes to pathway route plans.
E. Submittal Requirements at Close Out:
F. As-Built Drawings – primarily of the Communications Building Pathways.
G. Substitutions
H. Requests for substitutions shall conform to the general requirements and procedure outlined in Section 27 00 00.

1.6 QUALITY ASSURANCE

A. Comply with the quality assurance requirements of Section 27 00 00.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with Delivery, Storage and Handling requirements of Section 27 00 00.

1.8 WARRANTY

A. Warrant Work to perform as described within this Section for a period of 5 years. Correct deficiencies within 24 hours of notification.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. B-Line
B. CEAS
C. STI

D. RANDL
E. FSR
F. Wiremold
G. Panduit
H. Chatsworth
I. Or equal.

2.2 CONDUIT – EMT TYPE

A. EMT conduit shall conform to ANSI C80.3 specifications and shall meet UL requirements.
B. EMT conduit shall be formed of cold rolled strip steel, electrical-resistance welded continuously along the longitudinal seam and hot dip galvanized after welding.
C. Manufacturers:
   1. Alflex Corp
   2. Allied Tube and Conduit Co
   3. Anaconda
   4. Appleton Electric Co
   5. Occidental Coating Co. (OCAL)
   6. OZ/Gedney
   7. Spring City Electrical Manufacturing Co
   8. Thomas & Betts Corp
   9. Triangle PWC, Inc
   10. Western Tube and Conduit Corp
   11. Or equal

2.3 CONDUIT – COUPLERS

A. EMT

   1. Set screw type couplings: Electroplated, steel or cast malleable iron, UL Listed concrete tight. Use set screw type couplings with four setscrews each of conduit sizes over 2 inches. Setscrews shall be of case hardened steel with hex head and cup point to firmly seat in wall of conduit for positive grounding.
   2. Raintight couplings: Electroplate steel or cast malleable iron; UL Listed raintight and concrete tight, using gland and ring compression type construction.

2.4 CONDUIT – STRAPS

A. One-Hole and Two-Hole Straps
   1. Application: Strap, used in conjunction ion with fasteners, to hold conduit in place.
   2. Material: steel, malleable iron, or high tensile strength plastic straps (for inside building use) with malleable iron clamp-back spacer for surface mounted wall and ceiling applications.
B. Channel Straps
   1. Application: Strap, used in conjunction ion with channel and (as applicable) fasteners, to hold conduit in place.
   2. Material: steel, malleable iron, or high tensile strength plastic straps (for inside building use) with malleable iron clamp-back spacer for surface mounted wall and ceiling applications.

2.5 CONDUIT – MISCELLANEAOUS FITTINGS AND PRODUCTS

A. Watertight conduit entrance seals: Steel or cast malleable iron bodies and pressure

clamps with PVC sleeve, neoprene sealing grommets and PVC coated steel pressure rings. Fittings shall be supplied with neoprene sealing rings between the body and PVC sleeve.

B. Watertight cable sealing bushings: One piece, compression molded sealing ring with PVC coated steel pressure disks, stainless steel sealing screws and zinc plated cast malleable iron locking collar.

C. Expansion fittings: Multi-piece unit comprised of a hot dip galvanized malleable iron or steel body and outside pressure bussing designed to allow a maximum of 4" conduit movement (2" in either direction). Furnish with external braid tinned copper bonding jumper. Unit shall be UL Listed for wet or dry locations.

D. Expansion/deflection couplings: Multi-piece unit comprised of a neoprene sleeve with internal flexible tinned copper braid attached to bronze end couplings with stainless steel bands. Coupling shall accommodate .75-inch deflection, expansion, or contraction in any direction, and allow 30- degree angular deflections. Flexible, corrosion-resistant, watertight, moisture and heat resistant molded rubber jacket and stainless steel jacket clamps. Unit shall comply with UL467 and UL514B. Manufacturer shall be OZ/Gedney Type DX, Steel City Type EDF or equal.

E. Fire rated penetration seals:
   1. UL building materials directory classified.
   2. Conduit penetrations in fire rated separation shall be sealed with a UL classified fill, void or cavity material.
   3. The fire rated sealant material shall be the product best suited for each type of penetration, and may be a caulk, putty, composite sheet or wrap/strip.

F. Standard products not herein specified:
   1. Provide listing of standard electrical conduit hardware and fittings not herein specified for approval prior to use or installation, i.e. locknuts, bushings, etc.
   2. Listing shall include manufacturers name, part numbers, and a written description of the item indicating type of material and construction.
   3. Miscellaneous components shall be equal in quality, material, and construction to similar items herein specified.

2.6 VERTICAL MANAGEMENT SECTIONS

A. Application: Suitable for cable routing, cord routing, and cord slack storage vertically (between the top and bottom) within a rack bay.

B. The vertical management section shall be double-sided (i.e., the management section having covered cable guides on the front and flip-retainers on the rear).

C. Size & Capacity: The section between racks shall be 10” wide and the sections on the ends of the rack isle shall be 6” wide. 7’-0” high by 6” or 10” wide, with extra deep storage in the front and rear.

D. Mounting: The vertical management section having matching bolt holes for attachment to the rack.

E. Color: black (guides and cover).

F. Manufacturer:
   1. Panduit
      a. Panduit PEV6/PED6B1 – 6.7” Vertical Cable Manage/door (for use on both sides of single rack or end-of-row installations)
      b. Panduit PEV12/PED12B1 – 12” Vertical Cable Manager/door (for use between racks)
   2. Or Chatsworth equal

2.7 HORIZONTAL MANAGEMENT PANEL

A. Application: Suitable for installation into equipment rack for horizontal cord management. The horizontal management panel shall match (and fully integrate

with) the vertical management sections.

B. The horizontal management panel shall be single-sided.
C. Size: 1U and 2U high by 19” mounting wide.
D. Color: black (guides and cover).
E. Manufacturer:
   1. Chatsworth
      a. NM-1 - 1 RU 1-3/4” Horizontal Cable Manger
      b. NM-2 - 2 RU 3-1/2” Horizontal Cable Manger
      c. NM-3 - 3 RU 5-1/4” Horizontal Cable Manger
      d. NM-4 - 4 RU 4”” Horizontal Cable Manger, Front only
   2. Or Panduit Equal

2.8 WIRE BASKET CABLE TRAY (USER SPACE)

A. Provide cable tray (12” width minimum) sized as necessary to provide 60% free space for future needs.
B. Description: Continuous, rigid, welded steel wire mesh cable management system.
C. Mesh system permits continuous ventilation of cables and maximum dissipation of heat.
D. Continuous safety edge wire lip.
E. Wire mesh welded at all intersections.
F. UL Classification: UL#E556
G. Material: Carbon steel wire, ASTM A510, Grade 1008. Wire welded, bent, and surface treated after manufacture.
H. Electroplated Zinc Galvanized: Straight sections shall be made from steel meeting the minimum mechanical properties of ASTM A510 and shall be electro-plated zinc dichromate in accordance with ASTM B633 SC2.
I. Fittings: Field fabricated in accordance with manufacturer's instructions from straight sections.
J. Hardware shall include splice connectors and support components furnished by manufacturer.
K. Manufacturer:
   1. Cablofil
   2. CF54/300
   3. CF54/150

2.9 CABLE HANGERS

A. Application: Suitable for indoor installation within ceiling space for the support of communications cables.
B. Manufacturer:
   1. CEAS Figure 200 Series Low Voltage Supports
   2. Or equal

2.10 FLAT BAR

A. Application: Suitable for indoor installation within ceiling space for the support of communications cables.
B. Manufacturer:
   1. CEAS Figure 224 Low Voltage Support
   2. Or equal (no known equal)

2.11 FIRE RATED PENETRATION ASSEMBLY

A. Penetration assemblies shall be UL Listed for the application.
B. Penetration assemblies shall meet or exceed the rating of the wall (or floor) being penetrated.

C. Manufacturer
   1. STI EZ-Path 44 Series
   2. Hilti CP 653 2 inches/4 inches Speed Sleeve, CP 658T 2 inches/4 inches Firestop Plug, 675T Firestop Board, CP 620 Fire Foam, CP 618 Firestop Putty Stick.
   3. Or equal (no known equal)

2.12 FIRE RATED /SMOKE BARRIER PENETRATION ASSEMBLY

A. Penetration assemblies shall be UL Listed for the application.
B. Penetration assemblies shall meet or exceed the rating of the wall (or floor) being penetrated.
C. Manufacturer
   1. STI EZ-Path 33 Series
   2. Or equal (no known equal)

2.13 OUTLET BOXES

A. Telecommunications outlet box shall be one-piece die formed or drawn steel, knockout type box of size and configuration indicated on the drawings.
B. Box size: 5-inch square by 2-7/8 inch deep shall be minimum
C. Listing: C ETL US
D. Manufacturer
   1. RANDL Industries
      a. TB-55057 Telecommunications Bracket Outlet Box
      b. TB-55017 Telecommunications Outlet Box
      c. TB-55058 Telecommunications Bracket Outlet Box
      d. TB-55018 Telecommunications Outlet Box
   2. Or equal

PART 3 - EXECUTION

3.1 EXAMINATION
A. Contractor shall thoroughly examine Project site conditions for acceptance of conduit system installation to verify conformance with Manufacturer and Specification tolerances. Do not commence with installation until all conditions are made satisfactory.

3.2 APPLICATION

A. Wire basket cable tray: Shall be used concealed for interior low voltage cables run above suspended ceilings.
B. Ladder cable tray: Shall be used in telecom rooms for support of low voltage cables.
C. Electrical metallic tubing (EMT): Shall be used concealed for interior low voltage cables where run above non-accessible ceilings, in stud walls, furred spaces and crawl spaces.

3.3 INSTALLATION

A. Support pathway systems per manufacturer requirements or as required by structural calculations.
B. The Contractor shall provide written documentation outlining and cable or pathway that does not meet requirement in the form of an RFI.
C. Interface with Other Work:
   1. Verify route prior to installation.
   2. Coordinate the installation of the cable pathway system with other trades.

3. Do not support from ductwork, piping, or other equipment hangers.
4. Install pathways so that cables do not touch or rest on other any other systems.

D. Installation clearances:
1. Install systems to maintain a minimum clearance of four (4) feet from any motor.
2. Install systems a minimum of six inches from fluorescent light fixtures, or other EMI sources. Power cables in EMT are acceptable.
3. Refer to drawings for side and top access clearance requirements to cable basket.
4. Refer to drawings for installation heights and clearances between cable basket and building structures.
5. Ladder and Wire Basket Cable Trays. Install cable tray systems in accordance with manufacturer's instructions and recognized industry practices and ensure that the installed system complies with requirements of the NEC and applicable portions of NFPA 70B, NEMA VE-2 "Cable Tray Installation Guidelines" and NECA's "Standards of Installation" pertaining to general electrical installation practices. Install cable basket system using splice connectors, support components, and other accessories by the same manufacturer.
6. Splice system sections using UL classified connector bolt, supplied by the same manufacturer. Splicing assemblies shall be the bolted type using serrated flange locknuts.
7. Bends shall have a minimum of a 12" bend radius.
8. Provide radius shields at each bend/corner of "T" type intersections and cross intersections.
9. Provide blind ends where cable tray termination is exposed (i.e. not at a wall)
10. Ground system per NEC 70 Article 250. Provide approved connection bolt to join system sections such that the spine of the system is considered a bonding jumper. Properly bond system to approved ground, as per NEC Article 250. Provide external grounding strap at expansion joints, sleeves, crossovers, and at other locations where system continuity is interrupted.
11. Test support systems to ensure electrical continuity of bonding and grounding connections, and to demonstrate compliance with specified maximum grounding resistance. See NFPA 70B, Chapter 18, for testing and test methods.
12. Provided Cable Dropout in all locations where the cable transitions out of the tray more than 6". This includes transitions from all cable trays to equipment racks or other pathways.

E. Cable Hangers and Flat Bars
1. Install hangers in accordance with recognized industry practices, to ensure that the installed system complies with requirements of the NEC, and applicable portions of NFPA 70B and NECA's "Standards of Installation" pertaining to general electrical installation practices.
2. Provide dedicated supports at stud locations with a maximum of forty-eight (48") separation.
3. Suspend wire or rod using components appropriate for the structure – e.g., powder-actuated clip fastener for wire, beam flange clip or angled flange clip for either wire or rod, or an embedded anchor for the threaded rod. Do not share support (wire/rod) with other trades. Do not support the hanger on ceiling grid support wires. Do not support the hanger from ductwork, piping, or other equipment hangers.
4. Install hangers six inches (6"), minimum, from light fixtures or other EMI source. Install hangers between six inches (6") and twelve inches (12") above ceiling grid.

F. Conduit
1. Locations of conduit runs shall be planned in advance of the installation and coordinated with ductwork, plumbing, ceiling and wall construction in the same

areas and shall not unnecessarily cross other conduits or pipe, nor block access to mechanical or electrical equipment.

2. Where practical, install conduits in groups in parallel vertical or horizontal runs and at elevations that avoid unnecessary offsets.
3. All conduits shall be run parallel or at right angles to the centerlines of columns and beams.
4. Conduits shall not be placed closer than 12 inches to a flue, parallel hot water, steam line or other heat producing source or three inches from such lines when crossing perpendicular to the runs.
5. Exposed conduit installation shall not encroach into the ceiling height headroom of walkways or doorways. Where possible, install horizontal raceway runs above water and below steam piping.
6. In long runs of conduit, provide sufficient pull boxes inside buildings to facilitate pulling wires and cables, with spacing not to exceed 150 feet. Support pull boxes from structure independent of conduit supports. These pull boxes are not indicated on the Drawings.
7. Provide all reasonably inferred standard conduits fitting and products required to complete conduit installation to meet the intended application whether noted, indicated or specified in the Contract Documents or not.
8. Install conduit in accordance with Manufacturer's written instructions, as indicated on Drawings and as specified herein.
9. Minimum Conduit Size: Unless otherwise noted herein or on Drawings, minimum conduit size shall be 1-1/4".
10. Install conduits in complete runs before pulling in cables or wires.
11. Install conduit free from dented, bruises or deformations. Remove and replace any damaged conduits with new undamaged material.
12. Conduits shall be well protected and tightly covered during construction using metallic bushings and bushing "pennies" to seal open ends.
13. Clean any conduit in which moisture or any foreign matter has collected before pulling in conductors. Paint all field-threaded joints to prevent corrosion.
14. In all empty conduits or ducts, install a “True Tape” conduit measuring tape line to provide overall conduit length for determining length of cables/conductors for future use.
15. Conduit systems shall be mechanically and electrically continuous throughout.
16. Metallic conduit shall not be in contact with other dissimilar metal pipes (i.e. plumbing).
17. Make bends with standard conduit bending hand tool or machines. The use of any item not specifically designed for the bending of electrical conduit is strictly prohibited.
18. A run of conduit between terminations at wire pulling points shall not contain more than the equivalent of two quarter bends (180 degrees, total).

G. Outlet Boxes

1. Install device/outlet boxes in accordance with manufacturer's written instructions, as indicated on drawings, and as specified herein.
2. Install boxes at the locations and elevations indicated on the drawings. Adjustment as required by field conditions and as coordinated with electrical and other trades.
3. Leave no unused openings in any box. Install close-up plugs as required to seal openings.
4. Provide cast metal boxes with gasketed cast metal cover plates where boxes are exposed in damp or wet locations or located in hazardous areas.
5. Use conduit outlet bodies to facilitate pulling of conductors or to make changes in conduit direction only. Do not make splices in conduit outlet bodies.
6. Supports

7. Support boxes independently of conduit system.
8. Support boxes, mounted above suspended acoustical tile ceilings, directly from the structure above.

H. Waterproofing:
1. At floor, exterior wall and roof conduit penetrations, completely seal clearances around the conduit and make watertight.
2. For roof penetrations, provide roof flashing, counter flashing and pitch-pockets.
3. Provide membrane clamps and cable sealing fittings for any conduit that horizontally penetrates the waterproof membrane.
4. Conduits entering the building within grade that horizontally penetrate a waterproof membrane shall fall away from and below the penetration on the exterior side a minimum of two times the conduit diameters.

3.4 TERMINATIONS AND JOINTS

A. Use raceway fittings that are of types compatible with the associated raceway and suitable for the use and location.
B. Raceways shall be joined using specified couplings or transition couplings where dissimilar raceway systems are joined.
C. Conduits shall be securely fastened to cabinets, boxes and gutters using two locknuts and an insulating bushing or specified insulated connectors. Where joints cannot be made tight, use bonding jumpers to provide electrical continuity of the raceway system. Where terminations are subject to vibration, use bonding bushings or wedges to assure electrical continuity. Where subject to vibration or dampness, use insulating bushings to protect conductors.
D. Conduit terminations exposed at weatherproof enclosures and cast outlet boxes shall be made watertight using specified connectors and hubs.
E. Raceway seal: Inject into wire filled raceways, a pre-formulated rigid 2 lbs. density polyurethane foam which expands a minimum 35 times its original bulk. Foam shall have the physical properties of water vapor transmission of 1.2 to 3.0 perms; water absorption less

than 2% by volume, fungus and bacterial resistant. Foam shall permanent seal against water, moisture, insects and rodents. Install raceway sealing foam at the following points:
1. Where conduits pass from warm locations to cold locations to prevent passage of water vapor (such as refrigerated spaces, constant temperature rooms, air-conditioned spaces, etc.).

3.5 SUPPORTS

A. Secure raceways and systems to building structures using approved fasteners, clamps and hangers spaced according to the NEC and as specified in structural drawings for the project.

3.6 FINAL INSPECTION AND CERTIFICATION

A. Punch the Work of this Section compliant to the requirements of Section 27 00 00.
B. Comply with system acceptance and certification requirements of Section 27 00 00.
C. DISD Network Infrastructure will not approve or accept any pathway installation that does not meet the installation requirements and codes listed in this document.

END OF SECTION 27 05 28

SECTION 27 10 00 – CATEGORY 6 STRUCTURED CABLING SYSTEM (SCS)

PART 1 - GENERAL

1.1 RELATED WORK

A. All Division 26 as it relates to this scope of work.

1.2 DESCRIPTION

A. Summary of Work:

1. Provide a complete and tested Structured Cabling System (SCS) for the interconnections of the Local Area Network (LAN). The SCS shall include fully terminated unshielded twisted pair cables, fiber optic cabling, raceways, conduit, back boxes, copper/fiber optic termination components, station mounting hardware, fiber optic enclosures, patch panels, copper/fiber optic patch cables, relay racks/cabinets, and other incidental and miscellaneous premises wiring system hardware as required for a complete, tested, and usable system that is in compliance with the latest NEC, ANSI/EIA/TIA, BICSI, and Authorities Having Jurisdiction codes and standards. The installation shall comply with all applicable requirements, design guidelines, and standards in effect at the job site and as indicated in the Drawings and Specifications.
2. Each IDF will connect to the MDF with a 12-strand single mode armored clad fiber optic cable.
3. If there are any discrepancies between the drawings and specification or among themselves, the contractor shall request clarification prior to providing pricing for the scope of work. If a request is not issued and a response not provided via a posted addendum, the contractor shall provide pricing for the most costly scenario and obtain clarification during the course of the project.
4. Cabling contractor shall provide (1) CAT6 cable routed from each new video surveillance camera to the nearest IDF / MDF.

1.3 QUALITY ASSURANCE

A. Acceptable manufacturers:

1. The equipment/products described herein and furnished per these specifications shall be the product of one manufacturer. All references to model numbers and other detailed descriptive data is intended to establish standards of design performance, and quality, as required
2. The approved manufacturers shall provide a complete category 6 solution with a 40-year performance warranty.
3. Acceptable product connectivity shall be manufactured by Ortronics and the acceptable cable shall be manufactured by Superior Essex. Only the manufacturers listed in this paragraph will be accepted.

B. Installer Qualifications:

1. The Data Cable System Installer shall be licensed and shall meet all applicable regulations of the State of Texas and Department of Labor insofar as they apply to this type of system. The proposer shall be a firm normally employed in the low voltage and data cabling industry and shall provide a reference list of ten (10) large-scale projects and contact names confirming successful Category 6 premises wiring system installations.

2. The SCS Installer shall be a Ortronics/Superior Essex, local area, integrator of the manufacturer’s product and must be able to provide the manufacturer’s maximum available warranty on the entire SCS. The contractor’s certification must have been obtained and held within 75 miles of the project’s location.
3. The installing contractor must have a full-time employed RCDD (Registered Communications Distribution Designer) on staff. Current RCDD certification shall be provided in the product submittals.
4. All individuals installing the SCS must be employees of the certified installer and at least 30% of the installing staff shall have undergone a training class given by the

manufacturer. Current certification indicating the successful completion of the training course shall be available upon request at the project and submitted in the contractor's product submittals.

5. The proposing contractor and the installing contractor must be the same company. No subcontractor to the proposing SCS contractor will be allowed for any portion of the SCS scope of work.

C. Pre-Construction Meeting:
   1. The successful Contractor shall attend a mandatory pre-construction meeting with the project's consultant and individuals deemed necessary by the Owner's representative prior to the start of the work. No SCS work shall begin prior to this meeting.

D. Acceptance:
   1. The Owner's representative reserves the right to reject all or a portion of the work performed, either on technical or aesthetic grounds.

E. Warranty:
   1. The selected system installer shall be a certified installing contractor of product and hold current certification. Contractor shall provide a 40 year end to end performance warranty on all products installed. The proposer shall provide current certification documentation. The performance warranty shall be issued by the manufacturer and shall warrant that ALL Enhanced Category 6 cable links have been tested bi-directionally (end to end) using a Level 2 or better tester, per TSB-67, and that all test results conform to the most current TIA/EIA-568-A and/or TSB-67 Link values.
   2. The warranty will also cover multimode fiber optic cabling. Performance testing shall be conducted in accordance with ANSI/EIA/TIA-526-14 Standard, method B.
   3. The warranty will stipulate that all products used in this installation meet the prescribed mechanical and transmission specifications for such products as described in ISO/IEC 11801, ANSI/TIA/EIA-568-A, or EN 50173. Quality and workmanship evaluation shall be solely by the Owner/Designer and designated representatives.

1.4 REGULATORY REQUIREMENTS

A. Standards: All work shall be performed in accordance with the latest revisions of the following standards and codes:
   Latest Local Codes and Amendments
   2008 National Electrical Code

B. Other References:

   1. TIA/EIA-568-B Commercial Building Telecommunications Wiring Standard
   2. EIA/TIA-569 Commercial Building Standard for Telecommunication Pathways and Spaces.
   3. TIA/EIA-606 The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.
   4. TIA/EIA-607 Commercial Building Grounding and Bonding Requirements for Telecommunications.
   5. EIA/TIA 455-A Standard Test Procedure for Fiber Optic Fibers, Cables, Transducers, Sensors, Connecting and Terminating Devices and Other Fiber Optic Components.
   6. TIA/EIA TSB 67 Transmission Performance Specification for Field Testing of Unshielded Twisted-Pair Cabling Systems.
   7. TIA/EIA TSB 72 Centralized Optical Fiber Cabling Guidelines
   8. ISO/IEC 11801 Generic Cabling Standard
   9. EN 50173 Generic Cabling Standards for Customer Premises
   10. ANSI/EIA/TIA 526-14 Optical Power Loss Measurements of Installed Multimode Fiber Cable Plan.

C. Governing Codes and Conflicts: If the requirements of these specifications or the Project Drawings exceed those of the governing codes and regulations, then the requirements of these specifications and the Drawings shall govern. However, nothing in the Drawings or

Specifications shall be construed to permit work not conforming to all governing codes, regulations, and manufacturer installation requirements.

1.5 ABBREVIATIONS

A. The following abbreviations are used in this document:

DC Direct Current
IDF Intermediate Distribution Frame
MDF Main Distribution Frame
PBX Private Branch Exchange
UTP Unshielded Twisted Pair

1.6 SUBMITTALS

A. Project Initiation:

1. Within fourteen (14) days of Notice to Proceed, the data network system installer shall furnish the following in a single consolidated submittal:
    a. Permits: The Contractor shall obtain all required permits and provide copies to the Owner/Architect/Engineer.
    b. Product Literature: Complete manufacturer's product literature for all cable, patch panels, cross-connect blocks, cable supports, cable labels, outlet devices, and other products to be used in the installation. In addition, whenever substitutions for recommended products are made, samples (when requested by the Owner/Designer) and the manufacturer's supporting documentation demonstrating compatibility with other related products shall be included. The submittal shall have some type of distinguishing marker or pointer to indicated what specific product is to be provided
    c. Construction Schedule: A time-scaled Construction Schedule, using PERT/CPM, indicating general project deadlines and specific dates relating to the installation of the cable distribution system.
    d. Testing: Proposed Contractor Category 6 UTP cable test result forms, fiber optic cable test result forms and a list of instrumentation to be used for systems testing.
    e. Specification Compliance: A letter shall be provided stating, by section and subsection, that the SCS installer complies with the ENTIRE specification section. If the installer intends to deviate from any portion of the specifications, a detailed explanation of reason in which the installer would like to deviate shall be provided in addition to the specification compliance letter. NO DEVIATIONS SHALL BE ACCEPTABLE UNTIL THEY HAVE BEEN ACCEPTED BY OWNER.
    f. Certifications: The contractor shall submit all of the following certifications, and the certifications must contain dates which are valid from the date of proposal and not expirer any sooner than 12 months after substantial completion of the project. 1) BICSI RCDD Certification: This certification must be held by an on-staff, full-time employee of the SCS installer. The holder must be staffed out of the office that is located within 75 miles of the projected.
2. Ortronics/Superior Essex Certification: This certification has been obtained by the SCS installer's office that is located within 75 miles of the project and shall be a company certification, not and individual certification.
3. Ortronics/Superior Essex Certification: This certification must be held by at least 30% of the, on-site, staff and be made available at the site if requested by the owner, architect, and/or project's technology consultant.
4. Fiber Optic Technician Certification: This certification must be held by the on-staff/on-site individual that is supervising the fiber optic installation and performing the fiber optic terminations and testing.

B. Shop Drawings:

1. Submit the following items, for Owner review and approval, within twenty-eight (28) days of notice to proceed:

a. Proposed circuit routing and circuit grouping plan prepared by a BICSI certified RCDD (Registered Communications Distribution Designer). The RCDD certification must be current. Identifiable, separate routing shall be shown for both the station cabling and the MDF-to-IDF tie cabling.
b. In addition to the cable routing, the submitted drawings shall indicate the following, even if the following is expected to be provided by the project's electrical or general contractor:
   (1) Location of wall penetrations (all penetrations shall be sleeved and contain protective bushings at both ends)
   (2) Location of sleeved wall pass-thru
   (3) Size of sleeve at each location installed
   (4) Quantity of cable passing through each sleeve
   (5) Location of drops in each room (quantity or labeling of drops are not required in the submittal plans. Labeling shall be provided in the closeout plans and quantities shall be as per the contract documents, addendums, and issued changes. Each drop shall be labeled for the type of outlet that it is.
   (6) Conduit routing, size, quantity, and stub-up locations for all floor mounted outlets.
c. Drawing Compliance: A letter shall be provided stating that the SCS installer complies with the ENTIRE project drawing, including all general, keyed, and notes to contractor. If the installer intends to deviate from any portion of the specifications, a detailed explanation of reason in which the installer would like to deviate shall be provided in addition to the specification compliance letter. NO DEVIATIONS SHALL BE ACCEPTABLE UNTIL THEY HAVE BEEN ACCEPTED BY THE OWNER.

C. Close-out Procedures:
1. Two (2) copies of the following documents shall be delivered to the building owner's representative at the time of system acceptance. The close out submittals shall include:
   a. Inspection and Test Reports: During the course of the Project, the Contractor shall maintain an adequate inspection system to ensure that the materials supplied and the work performed, conform to contract requirements. The Contractor shall provide written documentation that indicates that materials acceptance testing was conducted as specified. The Contractor shall also provide documentation, which indicates that all cable termination testing was completed and that all irregularities were corrected prior to job completion.
   b. Provide complete test reports for all cabling and devices that comprise system as outlined in this document.
   c. Include the Name, address and telephone of the authorized factory representative with a 24-hour emergency service number.
   d. The manual shall also include Manufacturer's data sheets and installation manuals/instructions for all equipment installed, a list of recommended spare parts.
   e. Generic or typical owner's instruction and operation manual shall not be acceptable to fulfill this requirement.
   f. An up-to-date record ("as-built") set of approved shop drawing prints that have been revised to show each and every change made to the structure cabling system from the original approved shop drawings. Drawings shall consist of a scaled plan of each building showing the placement of each individual item of the technical cabling system equipment as well as raceway size and routing, junction boxes, and conductor size, quantity, and color in each raceway.
   g. As-built Drawings shall include cable pathways, camera locations with correct labeling and MDF/IDF locations. The as-built drawings shall be prepared using AutoCad 2016 or later. Provide the Owner with electronic versions of the as-builts on thumb drive media.
   h. All drawings must reflect point to point wiring, device address and programmed characteristics as verified in the presence of the engineer and/or the end user unless device addressing is electronically generated, and automatically graphically self-documented by the system.
   i. A copy of the manufacturer's warranty on the installed system.

j. Any keys to cabinets and/or equipment and special maintenance tools required to repair, maintain, or service the system.
k. Operating and Maintenance Instructions for all devices within the system. These instructions shall reflect any changes made during the course of construction, and shall be provided to the Owner, for their use, in a three-ring binder labeled with the project name and description. (4 copies)
l. Upon completion of the work and at a time designated by the Architect or owner, provide formal training sessions for the Owner's operating personnel to include location, operation, and maintenance of all included systems and equipment. Minimum amount of training time shall be at least 4 hours.
m. One (1) 30" x 42" laminated floor plan sheets illustrating technology drops and cable designation. Contractor shall provide one complete floor plan sheet for each telecommunications room (MDF or IDF)

PART 2 - PRODUCTS

2.1 GENERAL

A. Installation:
1. The cabling shall be installed per requirements of the manufacturer and the Project Documents utilizing materials meeting all applicable TIA/EIA standards. The Contractor is responsible for providing all incidental and/or miscellaneous hardware not explicitly specified below as required for a complete and operational system.

B. Materials:
1. Materials shall be as listed or shall be approved equivalent products of other manufacturers meeting the intent and quality level of the TIA/EIA specifications. All approved equivalent products will be published by addendum ten days prior to proposal for Architect/Engineer to review.

C. Testing:
1. All installed cabling shall be tested 100% good after installation by the Contractor. All final test results shall be delivered to owner at completion of project. Refer to closeout requirements listed under section 1.5.

D. Ratings:
1. All products shall be new and brought to the job site in the original manufacturer's packaging. Electrical components (including innerduct) shall bear the Underwriter's Laboratories label. All communications cable shall bear flammability testing ratings as follows: CM Communications Cable CMP Plenum Rated Communications Cable CMR Riser-Rated Communications Cable

E. Initial Cable Inspection:
1. The Contractor shall inspect all cable prior to installation to verify that it is identified properly on the reel identification label, that it is of the proper gauge, containing the correct number of pairs, etc. Note any buckling of the jacket that would indicate possible problems. Damaged cable or any other components failing to meet specifications shall not be used in the installation.

F. Cable Lubricants:
1. Lubricants specifically designed for installing communications cable may be used to reduce pulling tension as necessary when pulling cable into conduit.
2. Approved Products
a. Twisted-pair cable: Dyna-Blue American Polywater

G. Fire Wall Penetrations: Any penetration through firewalls (including those in sleeves) will be resealed with an Underwriter Laboratories (UL) approved sealant.
1. Approved Products
a. Wiremold Flamestopper - #FS4R-RED
b. Precut 4" conduit - #FSPCC4758

2.2 DATA CLOSET (MDF/IDF) CATEGORY 6 TERMINATION HARDWARE

A. Equipment Racks/Cabinets:
   1. Provide and install equipment racks and/or cabinets in locations indicated on the attached drawings for the following areas.
      a. For all IDF and MDF locations:
         (1) Contractor shall provide and install new Panduit floor mounted rack systems. Refer to floor plan and enlarged MDF/IDF room layouts for number or racks to provide at each location.
      b. For dedicated MDF rooms, provide the following quantity of cabinets unless otherwise shown on the drawings.
         (1) Floor mounted CCTV cabinet – Panduit R2P (provide minimum of 1 each unless indicated differently on the project floor plans)
         (2) Floor Mounted Server Cabinet – Panduit R4P (provide minimum of 4 each unless indicated differently on the project floor plans)
         (3) 2-post floor mounted rack – Panduit R2P
      c. For IDF rooms that are not dedicated spaces or have public access, provide:
         (1) Wall mounted cabinet – Middle Atlantic Product No. SR-40-32
            (a) Perforated Front Door with Lock, LVFD-40
            (b) 8-Outlet 15A Rack mount power/light, PDLT-815RV-RN
            (c) 11-Outlet 15A Power/Cooling, PDCOOL-1115R

   Note:

      1. All joined rack systems will have Panduit PE2V10 between cabinets and PE2V06 at the end of each cabinet.
      2. Contractor shall provide and install a new floor mounted cabinet/rack system or a wall mounted cabinet, where indicated on plans. Refer to floor plan and enlarged MDF/IDF room layouts for number or racks to provide at each location. If an enlarged detail is not available, the contractor shall provide the required number of floor mounted cabinets in the MDF and the required number of floor mounted racks (or wall mounted cabinets if the IDF does not have the required space to install a rack while maintaining 36” on three side of the rack system; or if the IDF is not a dedicated IDF closet) in each IDF to accommodate 100% of all termination components and an equal amount of owner equipment; as well as (1) spare rack. All rack systems shall include the required cable tray, wire management, termination hardware, and any other material required to furnish a complete rack system.

B. Distribution Rack/Cabinet Grounding
   1. All Racks and/or Cabinets shall be grounded using stranded #6 AWG insulated copper conductor. Connect to service entrance grounding electrode. Provide all required bonding materials and hardware and bond to building grounding electrode subsystem at building electrical service entrance.
      a. Approved Products –Grounding Compression Lugs NSi #L6N-14
      b. Approved Products – Wall Mount Bus Bar (one per MDF/IDF location) Ortronics, #OR-GB2X12TGBKIT

C. Fiber Optic Patch Panels / Enclosures:
   1. The enclosures used shall provide termination panels for LC type connectors and be of sufficient size and capacity to terminate 110% of the fiber count of the inside of outside fiber optic cables. Patch panels must be 19” rack mountable. Provide all termination accessories, fiber patch cords, enclosures and test for a complete fiber optic distribution system.

      Approved Products (for MDF/IDF locations):
      Ortronics Rack mount Fiber Cabinets – OptiMo FC Series:

a) Provide a 1RU fiber optic enclosure as designated on the project drawings: Ortronics Product No. OR-FCO1U-P
b) Provide 2RU enclosures as required to accommodate fiber counts of 72 or less, Ortronics Product No. OR-FCO2U-P
c) Provide 4RU enclosures as required to accommodate larger fiber counts. Ortronics Product No. OR-FCO4U-P

2. Provide closet connector housing panels, size for 110% of total fiber count to be terminated. Approved products Ortronics, Model # OFP-LCD12LC (for all multimode terminations) Ortronics, Model # OFP-LCD-12AC (for all single-mode terminations)
3. Provide LC adapters panels for all ports on unit, 6 pack duplex LC panels.
   a. Singlemode: Ortronics Product No. OFP-LCD12LC
   b. Multimode: Ortronics Product No. OFP-LCD-12AC
4. Provide three (3) fiber patch cords, at each end of each fiber installed for the connection of the owner provided network equipment.
   a. 10’ Multimode 50/125um SC-to-LC – Corning # 050502T5116003M
5. Provide new panels for IDF locations as well as new panels required at all MDF locations.

D. Category 6 Patch Panels: The Category 6 data station cable shall be terminated on Category 6 RJ45 patch panels with circuit board construction, T568B terminations. Patch panels shall be angled, 19-inch rack mountable. Workstation patch panels shall terminate all workstation communications outlets. Furnish units that adhere to the performance requirements TIA/EIA-568A standards.
   1. Approved Products:
      a. Ortronics Category 6 Modular Patch Panels 24 Port #OR-PHA66U24
      b. Ortronics Category 6 Modular Patch Panels 48 Port #OR-PHA66U48
      c. (provide cable support bars at the back of all patch panels to provide additional support at rear of rack and panels)

   Note:

   Group all cabling for Wireless Access Points together starting on the 1st patch panel and then continue with the rest of the data cables on the same panel. Fill all patch panel ports before moving on to the next patch panel. Do not segregate patch panels by other application types.

E. Rack Electrical:
   1. A power strip shall be installed vertical at the back of each data relay rack. Approved Products:
      a. MDF – Power Distribution Units:
      b. Tripp-Lite PDUV20 1.9kW Single-Phase 120V Basic PDU, 14 NEMA 5-15/20R Outlets, NEMA L5-20P Input w/ 5-20P Adapter, 15’ Cord, Vertical (2 for every 42 RU Rack)
   2. IDF – Power Distribution Units:
      a. Tripp-Lite PDUV20 1.9kW Single-Phase 120V Basic PDU, 14 NEMA 5-15/20R Outlets, NEMA L5-20P Input w/ 5-20P Adapter, 15’ Cord, Vertical (2 for every 42 RU Rack)
   3. Provide the following electrical ups equipment as noted below:
      a. All battery backup is OFOI

F. Cable Management Panels: Provide cable management panels as required for horizontal and vertical cable management. Provide vertical wire management on ends and in between all racks on entire project.
   1. Approved Products
      a. Panduit PE2V06 on ends of each cabinet. Panduit PE2V10 In between each cabinet.
         (1) Provide 1 ru rack blank and 1 empty space underneath each patch panel.

2.3 CABLE ROUTING/PATHWAY

A. Cable Tray: Metal cable tray shall be provided to affix to the top of all floor mount racks. Cable tray shall be used to brace racks to walls and to route cable from walls to racks in communication closets.
   1. Approved Products:
      a. Ladder Rack Straight Sections: Ortronics #OR-TRT10 (black). Provide vertically down wall and horizontally to rack.
      b. Ladder rack Curved Section: Ortronics #OR-TRTC1-12B (black), Provide for each transition from vertical wall run to horizontal run.
      c. Ladder Rack 90° Horizontal E-Bend Section: Ortronics #OR-TRTHR-12B (black). Provide as required.
      d. Rack to Runway Mounting Plate: Ortronics #OR-JP06-12B (black). Provide one each per rack.
      e. Wall Angle Support Kit: Ortronics #OR-P129240HB (black). Provide as required per ladder tray and wall junction.
      f. End Cap Kit: Ortronics OR-2-E1-25C-A (black). Provide as required per exposed end of ladder tray
      g. Junction Splice Kit: Ortronics #OR-P820147H (black). Provide as required per junction.
      h. Ladder Rack Elevation Kit, Ortronics #OR-REK-2-3
      i. And all applicable installation accessories.

B. Cable Support System: All low voltage cabling shall be installed and supported using a Caddy Cable Cat or Arlington Loop cable support system at 48” intervals unless installed in conduit. Do not exceed manufacture recommendation for the quantity of cables supported in an individual support.

C. All cable bundles shall be grouped together using plenum rated Velcro for the entire run above and below the ceilings.

D. Innerduct shall be bright orange and shall be labeled fiber optic cables from fiber patch panel to conduit or plenum entrances. Innerduct installed in plenum rated ceilings shall be plenum rated.
   1. Approved products
      a. Carlon
      b. Dura-line

2.4 STATION WIRING

A. Wire: The data and voice wire provided for all outlets shall be (Category 6) unshielded twisted pair, four-pair, 24 AWG solid copper conductor, meeting the intent and quality level of the TIA/EIA-568-B Commercial Building Wiring Standard. Refer to floor plan and data outlet legend for number of active data ports to specified faceplates.
   1. Approved Products: For all voice and data connections:
      a. Plenum-Rated Superior Essex 10Gain Category 6 (yellow color for all voice/data drops on entire project)
         (1) Superior Essex Part #66-246-6B

B. Testing: The Category 6 four-pair UTP cable must be UL Performance Level tested. Each 1000 foot spool must be individually tested with test results affixed to the spool. ALL CABLE MUST BE PROVIDED ON NEW 1000 FOOT SPOOLS. NO SHORTS WILL BE ALLOWED.

C. Rating: Cable installed in conduit shall be non-plenum rated. Cable not installed in conduit shall be plenum rated if installed in plenum ceiling space, non-plenum rated otherwise.

D. All cable shall be routed to the center of the room in which it is serving and then route to the outlet location that it is intended for.

E. Provide 10’ service loop at all headend locations properly supported above ceiling. Provide 3’ service loop at each workstation outlet properly supported above ceiling. All workstation service loops shall be made in figure eight configurations, no exceptions.

2.5 STATION HARDWARE

A. Ortronics Series II Jacks: Jacks shall be high quality Category 6 RJ45 modular jacks with circuit board construction and IDC style or 110-style wire, T568B terminations. Jacks shall meet EIA/TIA TSB40 recommendations for Category 6 connecting hardware.
   1) Approved Products – Data, Wireless, Security and Analog Jacks:
      A. All jacks to be fog white in color, OR-S21600 or OR-S22600
   2) All blank inserts shall match the plate color.
   3) Provide 10% Series II jacks for future expansion of additional network drops

B. Faceplates: Faceplates shall be a Series II Low-Profile Faceplate.
   1. Single Gang, Product Code OR-40300158
   2. Provide wall mounted handset faceplates where applicable for wall mounted phone. Refer to floor plan for locations. Part #OR-40300637
   3. Provide Mounting Straps (where applicable)

C. Workstation Patch Cables: Station side patch cables will be OFOI.

D. Network Cabinet Patch Cables: Cabling Contractor shall provide owner with Category 6 patch cable for each data drop on entire project. These cables will provide connectivity from the front of the network patch panels to the network equipment provided by owner upon move-in. The patch cables are to be terminated properly with RJ-45 connections on each end with the proper pin-out assignments per project configuration.

E. Cabling Contractor shall provide an extra 50 of each color and length for future expansion purposes.
   Approved Products:
   1. Cat 6 stranded copper Patch Cords. Patch cable colors to be Grey in color for all system types.
   2. Provide 100% Quiktron Product No. 576-100-001 (1’ Grey)
   3. All patch cables shall be factory terminated. NO EXCEPTIONS.

2.6 FIBER OPTIC PRODUCTS

A. Multimode:

1. 50/125um micron multimode (OM4+) fibers, each with a color-coded PVC tight buffer shall have a maximum attenuation of 3.5 dB/km at 850 nm and 1.5 dB/km at 1300 nm. Minimum bandwidth shall be 2000 MHz/km at 850 nm and 500 MHz/km at 1300 nm and contains no metallic elements.

2. Approved Products:

   a. Intra-building Multimode:
      i. Indoor/Outdoor, Tight-Buffered, Interlocking Armored Cable, Plenum, 24-F, 50 µm multimode, extended 10G distance. Corning # 024T8P-31191-A3
      ii. Tight-Buffered, Interlocking Armored Cable, Plenum, 24-F, 50 µm multimode, extended 10G distance Corning # 024T88-33190-A3
      iii. All non-armored fiber optic cable shall be installed in 1” inner duct throughout the entire run. Inner duct to be rated for the space in which it is installed in.

iv. No fusion or mechanical splices will be allowed at any point in the fiber optic runs, unless specifically noted otherwise.
v. Terminate all strands. Connect 12 strands to patch panel and leave balance coiled in or behind bulkhead with protective covers in place as spares.

B. Connectors: Optical Fiber Connectors shall be SC type connectors.

1. Approved Products:
   a. Optical Fiber Connectors shall be LC Splice-On type connectors
   b. Single-Mode – Corning LC Connector Product No. SOC-LC-900-SM
   c. Multimode – Corning LC Connector Product No. SOC-LC-900-OM4 (OM3/OM4 compatible).

2.7 WIRELESS

A. For the proper functioning and protection of the wireless infrastructure in designated areas of the campus building the contractor shall use the following:
B. All wireless access points located in high volume spaces shall be located on the wall and at a maximum of 12' A.F.F.
C. Provide wiring to each location. AP shall be owner provided.

PART 3 - EXECUTION

3.1 GENERAL

A. Fire Wall Penetrations
The contractor shall avoid penetration of fire-rated walls and floors wherever possible. Where penetrations are necessary, they shall be made using the combination of Pre-Cut Conduit #FSPCC-4758 and Wiremold Flamestopper FS4R-RED fittings. Contractor shall also seal all floor, ceiling and wall penetrations in fire or smoke barriers and in the wiring closet.

B. Allowable Cable Bend Radius and Pull Tension
In general, communications cable cannot tolerate sharp bends or excessive pull tension during installation. Refer to the cable manufacturers allowable bend radius and pull tension data for the maximum allowable limits.

C. Cable Lubricants
After installation, exposed cable and other surfaces must be cleaned free of lubricant residue.

D. Pull Strings Provide pull strings in all new conduits, including all conduits with cable installed as part of this contract. Pull test is not to exceed 200 pounds. Data and video cables can be pulled together with pull strings.

E. Conduit Fill Conduit fill shall not exceed 40%.
F. Damage
   1. The Contractor shall replace or rework cables showing evidence of improper handling including stretches, kinks, short radius bends, over-tightened bindings, loosely twisted and over-twisted pairs at terminals and cable sheath removed too far (over 1-1/2 inches).
   2. The Contractor shall replace any damaged ceiling tiles that are broken during cable installation.

G. Clean Up

All clean up activity related to work performed will be the responsibility of the Contractor and must be completed daily before leaving the facility.

3.2 DOCUMENTATION

A. Labels: The Contractor will label all outlets using permanent/legible typed or machine engraved labels approved by the Owner (no handwritten labels permitted). Label patch panels in the wiring closet to match those on the corresponding data outlets. The font shall be at least one-eighth inch (1/8") in height, block. All labels shall correspond to as-builts and to final test reports.

The following nomenclature should be used when labeling data/voice jacks:

All cables being served by MDF closet shall begin with 'MDF'# all IDF served cables shall begin with 'IDF'# (# designated MDF/IDF closet number).

Next identification letter shall refer to patch panel that is serving outlet (A,B,C…)

Next identification shall note what # data port on patch panel (01 thru 48).

Example:

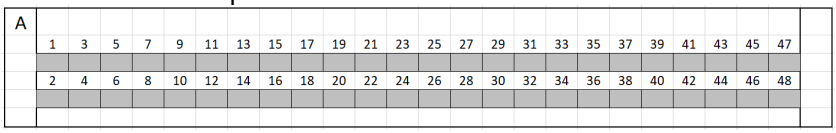
Outlet from 23rd port of the third patch panel from top of rack located at IDF-201
IDF 201 - C23

Outlet from the 5th port of the second patch panel from the top of rack located at MDF-101
MDF 101- B5.

The following shall be used when labeling patch panels:

The first patch panel (Panel at the top of rack) will be Patch Panel A

Each 48 port patch panel will be labeled with all odd numbered ports on the top and all even numbered ports on bottom.



B. Floor Plan

A floor plan clearly labeled with all outlet jack numbers shall be included in the as-built plans. Each MDF/IDF closet shall have a laminated drawing (42"x30") showing the service area for that closet with all outlet jack numbers.

C. Cables: All cables shall be labeled at both ends. This includes but not limited to horizontal voice and data cabling, copper backbone tie cables, and fiber optic cables.

D. Fiber Optics: Fiber optic strands shall be labeled at both ends on the fiber distribution panel.

E. Equipment racks: Equipment racks shall bear at least one indicating label indicated MDF or IDF. If rack is installed in IDF, label shall include IDF #.

F. Access Points: Label ceiling grid with digital label according to location installed.

3.3 EQUIPMENT RACK CONFIGURATION

A. Equipment Racks
   1. Equipment racks shall be assembled and mounted in locations shown on the Drawings and as detailed. Each rack shall be securely mounted to the floor and braced to the wall with cable tray in accordance with the manufacturer's instructions and recommendations. Racks shall be mounted such that the side rails are plumb with vertical cable management panels. Racks to be located such that future expansion can occur without relocating existing racks. Racks shall be grounded in accordance with NEC requirements.

B. Wire Management Components
   1. Vertical cable management panels shall be installed on each side of the rack. In instances where more than one rack is installed in a single location, vertical cable management shall be installed between the racks and on either side.

C. Cable Placement
   1. Cable installation in the Wiring Closet must conform to the Project Drawings. All cabling shall be routed so as to avoid interference with any other service or system, operation, or maintenance location. Avoid crossing area horizontally just above or below any riser conduit. Lay and dress cables to allow other cables to enter the conduit/riser without difficulty at a later time by maintaining a working distance from these openings.

D. Cable Routing
   1. Cable shall be routed as close as possible to the ceiling, floor or corners to ensure that adequate wall or backboard space is available for current and future equipment. All cable runs within the Wiring Closet shall be horizontal or vertical within the constraints of minimum cable bending radii. Minimum bend radius shall be observed. Cables shall not be tie-wrapped to electrical conduit or other equipment.

E. Installation
   1. All incoming cables shall be routed on the cable tray and neatly dressed down to the patch panels.

F. Hardware
   1. Provide rack and jack panel hardware as required for all data station wiring.

3.4 STATION WIRING INSTALLATION

A. General
   1. Cabling between wiring closet and workstation locations shall be made as individual home runs. No intermediate punch down blocks or splices may be installed or utilized between the wiring closet and the communications outlet at the workstation location.

   2. All cable must be handled with care during installation so as not to change performance specifications. Factory twists of each individual pair must be maintained up to the connection points at both ends of the cable. There shall never be more than one and one-half inches of unsheathed enhanced Category 6~~A~~ UTP cable at either the wiring closet or the workstation termination locations.

B. Exposed Cable
   1. All cabling shall be installed inside walls or ceiling spaces whenever possible. Exposed cables and/or cables routing through mechanical rooms, electrical rooms, or restrooms shall be installed inside conduits, unless noted otherwise on the project drawings. Additional exposed cable runs will require Owner approval and will only be allowed when no other options exist.
   2. All cable routing through conduits and sleeves shall maintain a 40% maximum conduit fill ratio.

C. Placement

1. All cabling and associated hardware shall be placed so as to make efficient use of available space. All cabling and associated hardware shall be placed so as not to impair the Owner's efficient use of their full capacity.

D. Cable Routes
   1. All cabling placed in ceiling areas must be in conduit, cable tray or a Caddy Cable Cat or Arlington Loop cable support. Cable supports shall be permanently anchored to building structure or substrates. Provide attachment hardware and anchors designed for the structure to which attached and that are suitably sized to carry the weight of the cables to be supported. Do not route cable through webbing of structural steel. Cabling must be supported in dedicated supports intended to support cabling as described in this section. Contractor shall adhere to the manufacturer's suggested fill ratio for each size cable support installed.
   2. Attaching cable to pipes or other mechanical items is not permitted. Communications cable shall be rerouted so as to provide a minimum of 18 inches spacing from light fixtures, sources of heat, power feeder conduits and EMI sources. Cabling shall not be attached to ceiling. Grid support wires. Cable runs shall be routed down the corridors; parallel or perpendicular to building structure. Multiple cables to be bundled together at and between each cable support installed.
   3. Contractor shall be responsible for coordinating with other trades on the project so that the installed cable pathway does not interfere with the installation of other systems to insure that mechanical ducts, pipes, conduits, or any other above ceiling systems are not putting unnecessary stress on any portion of the install SCS.

3.5 STATION HARDWARE

A. Flush Mount Jacks
   1. Flush mount jacks shall be mounted in a faceplate with back box.

B. Placement
   1. Where possible, the communications outlet shall be located so that its centerline is 18 inches above floor level or 12 inches above permanent bench surfaces. Outlets shall not be mounted on temporary, movable, or removable surfaces, doors, or access hatches.
   2. Outlets shall be installed within 3'-0" of power outlets

C. RJ-45 Jack Pin Assignments
   1. Pin connections for data station cable outlets and patch panels shall match EIA/TIA 568 modular jack wiring recommendation T568B.
   2. Pin connections at data jack panels shall match pin connections at outlets (straight through wiring)

D. Faceplate Icons: Contractor shall install faceplate icons.

3.6 CABLE TESTING REQUIREMENTS

A. Notification: The Owner and Engineer shall be notified one week prior to any testing so that the testing may be witnessed.

B. Inspection: Before requesting a final inspection, the Contractor shall perform a series of end-to-end installation performance tests. The Contractor shall submit for approval a proposal describing the test procedures, test result forms and timetable for all copper and fiber optic cabling.

C. Procedures: Trained personnel shall perform all testing. Acceptance of the test procedures discussed below is predicated on the Contractor's use of the recommended products and adherence to the inspection requirements and practices set forth. Acceptance of the completed installation will be evaluated in the context of each of these factors.

D. Errors: When errors are found, the source of each shall be determined, corrected and the cable retested. All defective components shall be replaced and retested. Re-test results must be provided on Owner approved forms and witnessed by Owner.

E. Twisted Pair Cable Testing:

1. At a minimum, the Contractor shall test all station drop cable pairs from Data Closet termination patch panels to outlet device RJ45 jacks. Category 6~~A~~ products shall be tested for compliance to ANSI/TIA/EIA 568A and ISO/IES 11801 for a Category 6 rated installation. Test equipment used shall meet TIA/EIA TSB-67, Level II accuracy. Further, the contractor shall have a copy of TSB-67 in their possession and be familiar with its contents.

2. Each wire/pair shall be tested at both ends for the following:
    a. Wire map (pin to pin connectivity)
    b. Length (in feet)
    c. Attenuation
    d. Near end cross talk (NEXT)
    e. Power Sum
3. Test equipment shall provide an electronic and printed record of these tests.
4. Test results for each Category 6 four-pair UTP cable must be submitted with identification to match labels on all patch panel ports and RJ45 jacks and must match as-builts associated with that cable.

F. Fiber Optic Cable Testing

1. Testing device for fiber optic cables shall be a high quality OTDR (Optical Time-Domain Reflectometer) equipped with a printer. The printed data shall show, in addition to any summary information, the complete test trace and all relevant scale settings. The OTDR must have the capability to take measurements from bare fiber strands as well as SC connector terminations.
2. All fiber optic cable shall be tested on the reel before installation to insure that it meets the specifications outlined herein.
3. After installation the Contractor shall test each fiber strand in accordance the EIA 455-171 Method D procedures (bi-directional testing) at both 850nm and 1300nm for multimode or 1310nm and 1550nm for singlemode. A form shall be completed for each cable showing data recorded for each strand including length, total segment (end-to-end) loss (dB) and connector losses (dB) at each end. In addition, the printed data strip for each strand shall be attached to the form. Patch cables shall also be tested.
4. Acceptable fiber optic connector loss shall not exceed .75dB per mated pair. The Contractor is responsible for obtaining minimum loss in fiber connections and polishing per manufacturer specifications.
5. Singlemode:
    a. Singlemode fibers shall have a maximum attenuation of 1.0 dB/km at 1310 nm and 1.0 dB/km at 1550 nm.
6. Multimode:
    a. 50/125um micron multimode fibers shall have a maximum attenuation of 3.5 dB/km at 850 nm and 1.5 dB/km at 1300 nm. Minimum bandwidth shall be 2000 MHz/km at 850 nm and 500 MHz/km at 1300 nm.
7. OTDR shots shall be provided for each strand of fiber optics completely installed and terminated.

3.7 INSPECTION

A. Conformance to the installation practices covered above are to be verified when completed. In some cases, the Owner/Designer may inspect before acceptance.

1. Written Test Report:
    a. Complete test results, including actual values associated with tests.
    b. Show all certifications for telecommunications wiring systems.

c. Include cable maps showing each cable route and keyed to cable labels. Provide owner with complete floor plans identifying outlet location and cable routing drawing in AutoCad format. Provide electronic copy of drawings to owner in AutoCad version 2004 or greater.
d. Documentation of outlet, cable and rack labeling system.

B. After performing all tests, tabulate results and bind together in format acceptable to Owner. Installer shall provide written certification in the test report that telecommunications cable is properly installed, and test results certify system to all specified standards.

END OF SECTION 27 10 00

SECTION 27 41 00 - LOCAL SOUND AND AUDIO-VIDEO SYSTEMS

PART 1- GENERAL

1.1 SECTION INCLUDES:

A. Furnish and install a production quality sound system to cover the entire seating area.

B. The work to be provided under this section consists of furnishing and installing all equipment, cabling, labor, supervision, and services necessary of a complete and operating auditorium sound system.

C. The dance room sound system should include the components in Part 2. The components specified are to be used as a guideline, substitutions of equipment equal in quality will be allowed. Approval by DISD will be required for all substitutions.

D. The work of this section also includes:
   1. Verification of dimensions and conditions at the job site
   2. Preparation of submittal information
   3. Pick-up of Owner Furnished Equipment (OFE) and incorporation into project if applicable.
   4. Development and implementation of AV control system software code and control panel layouts, which will become the property of the Owner
   5. Installation in accordance with the contract document, manufacturer's recommendation, and in conformity with applicable codes and authority having jurisdiction (AHJ)

E. The drawings included with this specification convey general system concepts. The plans do not show complete and accurate building details. The Installer is responsible for making field measurements necessary to establish exact locations, relationships, load capacities necessary for the installation of these systems.

1.2 RESPONSIBILITY

A. All materials, equipment, transportation, and labor necessary to achieve a complete and functionally working system as shown or inferred on the Drawings and in the Specifications. Supply accessories and minor equipment items (such as, but not limited to: power strips, adapters, connectors, mounting hardware, etc.) needed for a complete system, even if not specifically mentioned in these Specifications or on the associated Drawings, without claim for additional payment.

B. Notwithstanding any detailed information in the Contract Documents, it is the responsibility of the Contractor to supply a full working, tested, and calibrated system. Notify the Architect of any discrepancies in part numbers or quantities before bid. Failing to provide such notification, supply items and quantities according to the intent of the Specification and Drawings, without claim for additional payment.

C. Specifications and drawings are complementary. Work called for by one is binding as if called for by both. Any discrepancies between specifications and drawings shall be

brought to the attention of the Architect for clarification during the bidding period. No allowance shall subsequently be made to the Contractor by reason of his failure to have brought said discrepancies to the attention of the Architect.

D. Execute all work in accordance with the National Electrical Code (NEC), the National Electrical Safety Code, the Occupational Safety and Health Act (OSHA) and all applicable State and Local codes, ordinances, and regulations. If a conflict develops between the contract documents and the appropriate codes and is reported to the Architect prior to bid opening, the Architect will prepare the necessary clarification. Where a conflict is reported after contract award, propose a resolution of the conflict and, upon approval, perform Work.

E. A Ground point will be provided in each equipment room or enclosure electrical panel. The installer shall be responsible for connecting ground points to all Equipment in accordance with NEC Code, local codes and standards specified herein.

F. Power is provided for this work at locations shown on the electrical riser diagram and or other drawings / information in electrical drawings and specifications. Power will be terminated to a panel within or near the equipment enclosure. The installer shall be responsible for termination and distribution of electrical power from the panel to the equipment as required.

1.3 QUALITY ASSURANCE

A. Qualifications: Contractor to be experienced in the provision of systems similar in complexity to those required for this project; and meets the requirements listed below. Provide documentation at the time of bid to support these qualifications.

1. No less than three years experience with equipment and systems of the specified types.
2. Experience with at least three comparable scale projects within the last three years.
3. Be a franchised dealer and service facility for the manufacturer's products furnished.
4. Maintain a fully staffed and equipped service facility with full time field technicians.
5. Have at least one supervisory on site employee having completed and certified CTS-I by Infocomm.
6. At the request of the Owner, demonstrate that:
    a. Adequate plant and equipment is available to complete the work.
    b. Adequate staff with commensurate technical experience is available.

B. Work: Perform Work in compliance with the applicable standards listed herein and governing codes and regulations of the authorities having jurisdiction and the Contract Documents.

7. Drawings and specification requirements govern where they exceed Code and Regulation requirements.
8. Where requirements between governing Codes and Regulations vary, the more restrictive provision applies.
9. Nothing in the Contract Documents grants authority or permission to disregard or violate any legal requirements.

C. Coordinate exact location and installation of equipment, power, grounding, and raceway requirements with the Architect.

1.2 DELIVERY, STORAGE, AND HANDLING

A. Ship Products in its original container, to prevent damaging or entrance of foreign matter.

B. Handling and shipping in accordance with Manufacturer's recommendation.

C. Provide protective covering during construction of all installed devices, to prevent damaging or entrance of foreign matter.

D. Replace at no expense to Owner, Products damaged during storage, handling or the course of construction.

1.3 PROJECT CONDITIONS

A. Verify conditions on the job site applicable to this work. Notify Architect in writing of discrepancies, conflicts, or omissions promptly upon discovery.

B. The Drawings diagrammatically show cabling and arrangements of equipment fitting the space available without interference. If conditions exist which make it impossible to install work as shown, recommend solutions and/or submit drawings to the Architect for approval, showing how the work may be installed.

1.4 WARRANTY

A. Warrant labor and equipment for one year following the date of substantial completion to be free of defects and deficiencies, and to conform to the drawings and specifications as to kind, quality, function, and characteristics. Repair or replace defects occurring in labor or equipment within the Warranty period without charge.

B. This warranty is in addition to any specific warranties issued by manufacturers for greater periods of time.

C. Within the warranty period, answer service calls within twenty-four (24) hours during normal working hours and correct the deficiency within forty eight (48) hours.

D. Provide Owner with the name and telephone number of the person to call for service. This information to be part of Project Closeout Documents.

E. Thirty days prior to the end of the warranty period provide a complete checkout of all system components. Repair or replace any defective equipment discovered during the testing. Correct any defects in wiring or other functional problems reported by Owner. Warranty replacement and service of equipment shall not apply to Owner furnished equipment (OFE). Coordinate observation visit with the Owner.

PART 2- DANCE ROOM LOCAL SOUND SYSTEM PRODUCTS

2.1 GENERAL

A. The System includes the following major items which must be reviewed by Owner:

1. Audio mixers (digital and analog), DSPs, equalizers, amplifiers, program sources, and other audio signal processing equipment.
2. Loudspeakers, speaker mounting or support hardware.
3. Equipment racks and millwork.
4. Cables, connectors, plates, and wiring.
5. Preparation of submittal information.
6. Installation in accordance with the contract documents, manufacturer's recommendations, and all applicable code requirements.
7. The Sound Contractor shall equalize the system using a real-time analyzer, reference microphone and a Microsoft Windows based PC to control all setup of the digital processor.

8. The sound system shall be a separate and distinct system, connected to the main PA / Intercom system for override announcement from PA / Intercom system. The main equipment rack shall be permanently affixed, where shown on the drawings. The local sound system shall automatically mute during a fire alarm event. When a fire alarm event is complete, the local sound system shall automatically resume normal operation.

9. Documented sound system tests and adjustments with a written report.

10. Instruction of operating personnel; provision ofmanuals.

11. Maintenance services; warranty.

12. All source code for all digital processing devices shall be the sole property of DISD.

2.2 SOUND SYSTEM DESCRIPTION

A. Local sound devices for all spaces shall be reviewed with District personnel as some devices noted are obsolete.

B. Wall mounted rack – 18 space, 19" RU, 22" - 24" deep with locking, vented, front door.

1. 1 qty. Middle Atlantic DWR 18-22 or equal

C. Mixer, 8 channel 1RU rack mixer.

D. Power sequencer with surge protection and remote switch – 20A with six rear outlets and three sequenced groups of outlets.

1. Manufacturers: Furman, Middle Atlantic, or approved equal

E. Amplifiers – Network capable with internal DSP. 2 ohm – 8 ohm and 70v operation. 600W per channel, minimum, @ 4 ohms; 1250W @ 4 ohms per channel for subwoofer.

2.3 PROGRAM SOURCES:

A. Two (2) digital wireless combo microphone systems, Shure QLXD G-50 or equivalent, with hand held mic and body pack with ear-set mic.

B. One (1) each media player with Bluetooth, Tascam CD-400U, or equivalent.

2.4 ACCESSORIES:

A. Three (3) each black tripods with boom arms

B. One (1) lectern microphone stand, complete with shock-mount

C. Three (3) each, 25-foot microphone extension cables, complete with connectors

2.5 SOUND SYSTEM CABLE REQUIREMENTS

A. All cable shall have labels on both ends utilizing self-laminating, flexible vinyl film and non-smear nylon marking pens.

B. Microphone cable shall be 1 pair 22 gauge twisted shielded West Penn 454 or approved equivalent.

C. Underground microphone and audio cable will be West Penn Aqua Seal or approved equivalent.

D. Speaker wiring shall be 12 gauge West Penn 227 for full-range speakers, 10 gauge West Penn C210 for subwoofer speakers; or approved equivalent. Plenum rated cable shall be used in plenum spaces.

2.6 AUDIO SYSTEM

A. 1 qty. Biamp TesiraForte AI, audio DSP (DSP)

1. DSP to be programmed to mute when announcements are made.

2. Provide RDL TX-70A to convert 70v audio signal to line level audio.

2.7 AUDIO AMPLIFIERS

A. 1 qty. Voltera A 600.2. (AMP)
   1. Program amplifier's DSP with data acquired during system tuning.
   2. Program each output channel with appropriate DSP settings to protect the speaker drivers from being over-driven and damaged.

2.8 WIRELESS MICROPHONES

A. 2 qty. Shure ULXD124/85/SM58 Frequency group H-50 Wireless Mic System. (WRLS)
   1. Provide presets for different mics used for EQ and dynamics (headset / handheld)
B. 1 qty. Shure ULXD1 Digital bodypack transmitter
C. 1 qty. Shure MX185 Cardioid lavalier microphone.
D. 2 qty. Shure SB900B Rechargeable lithium-ion battery
E. 1 qty. Shure SBRC Battery rack charger (SBRC)

2.9 WIRED MICROPHONES

1. 2 qty. Shure SM58LC.
2. 2 qty. K & M 26045-500-55 stackable mic stand.
3. 2 qty. K & M 211/2 mic stand boom arm.
4. 2 qty. Whirlwind MK425 XLR cable.
5. 2 qty. Whirlwind MST2R25 audio interface cable.

2.10 POWER DISTRIBUTION AND CONTROL

1. 1 qty. Middle Atlantic PDS-620R. (POWER)
   a. Amplifiers shall cycle ON last and cycle OFF first.
   b. Ensure there are no pops or other audible audio anomalies during system power cycling.

2.11 PROGRAM SOURCE

A. 1 qty. Tascam CD-400U (CD)

2.12 LOCAL SOUND EQUIPMENT RACK

A. 1 qty. Middle Atlantic DWR 16-22.
B. 1 qty. Middle Atlantic VFD-16.
C. 1 qty. Middle Atlantic D3 – 3RU Drawer (DRAWER)
D. 1 qty. Middle Atlantic FI-3
E. 1 qty. Middle Atlantic RSH – Single RU Shelf (RSH)
F. 1 qty. Middle Atlantic SSH – Single RU Sliding Shelf (SSH)
G. 1 qty. Middle Atlantic DWRSR-4-FK
H. 1 qty. 1ru custom rack blank with company name and service phone number.
I. Provide 5 extra front door keys to the Owner.
J. Populate all unused rack spaces with blank panels.

K. Install all rack mounted equipment with Middle Atlantic HTX, T20 Star Post, 10-32 security-screws.
L. qty. 1 Single custom rack blank with company name and service phone number.

2.13 LOCAL SOUND SYSTEM SPEAKERS

A. 6 qty. Desono DX-IC6-W - WHITE
   1. Tap speakers at 70 volts and 60 watts.
B. Securely attach all speakers to building structure at a 5:1 safety factor.
   1. Contractor shall employ rigging attachment hardware rated SAE Grade 5 minimum.

3 PART 3 – EXECUTION

3.1 GENERAL

A. Coordinate incorporation of the Work specified herein with other project work so as to facilitate a cohesive final Products.
B. The installation recommendations contained within ASDI and Telecommunications Distribution Methods Manual are mandatory minimum standards and requirements.
C. Mount equipment and enclosures plumb and level.
D. Permanently installed equipment to be firmly and safely held in place. Design equipment supports to support loads imposed with a safety factor of at least five. Seismic bracing shall be installed on appropriate equipment where local codes require such installation.
E. Verify all locations of equipment in all rooms with Owner's Representative, Owner, and Consultant.

3.2 INSTALLATION

A. Installation of cable and wiring
   1. Cabling and Wiring:
      a. Install cable in a manner to adhere to manufacturer's specifications for maximum cable pulling tension, minimum bend radius, and restrictions.
      b. Provide appropriate support at all horizontal-to-vertical transitions in order to keep the weight of the cable from degrading at the point of transition.
      c. If a J-hook or trapeze system is used to support cable bundles, all horizontal cables shall be supported at a maximum of 48-inch (1.2 meter) intervals. At no point shall the cables rest on light fixtures, acoustic ceiling grids, panels, conduits, sprinkler pipe, water pipe and/or HVAC system ducting.
      d. Horizontal distribution cables shall be bundled in groups of no more than 50 cables when being supported by J-Hook or trapeze systems. Cable bundle quantities in excess of 50 cables may cause deformation of the bottom cables within the bundle and degrade cable performance. An exception to this rule is when cable is installed in cable tray systems.
      e. Cable shall be installed above fire-sprinkler systems and shall not be attached to the system or any ancillary equipment or hardware. The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices
      f. Cables shall not be attached to ceiling grid or lighting fixture wires. Where support for horizontal cable is required, install appropriate carriers to support the cabling.
      g. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced prior to final acceptance at no cost to the Owner.
      h. Cables shall be identified by a self-adhesive machine label in accordance with the System Documentation Section of this specification and ANSI/TIA/EIA-606-A. The cable label shall be applied to the cable behind the faceplate on a section of cable that can be accessed by removing the cover plate.
      i. Unshielded twisted pair cable shall be installed so that there are no bends smaller than four times the cable outside diameter at any point in the run and at

the termination field.

j. Provide splice free wiring and cabling from origination to destination. Cables shall be installed in continuous lengths from origin to destination (no splices). Properly designed transition points, or consolidation points are not considered 'splice' points.

k. Make joints and connections with rosin-core 60/40 solder or with mechanical connectors specifically intended for the type and class of cable being used. Where spade lugs are used, crimp properly with ratchet type tool.

l. Take precaution to prevent and guard against electromagnetic and electrostatic hum. For line-level audio signal, float cable shield at one end. Shield not connected to be folded back over cable jacket and covered with heat-shrink tubing. Do not cut off unused shield.

m. Isolate cables and wires of different signals or different levels; and separate, organize, and route to restrict channel crosstalk or feedback oscillation in any amplifier section. Keep wiring separated into groups for microphone level circuits, line level circuits, loudspeaker circuits, and power circuits.

n. Connect cable to active components through XLR connections whenever multiple formats are available. Make connections to speaker transformers with properly sized closed end connectors crimped with factory approved ratchet type tool. Wire nut or "Scotchlock" connectors are not acceptable. Do not wrap audio cable splices or connections with adhesive backed tape.

o. Cover edges of cable and wire pass-through holes in chassis, housings, boxes, etc., with rubber grommets or Brady GRNY nylon grommetting.

p. Execute wiring in strict adherence to:

- Phillip Giddings. Audio System Design and Installation. Indianapolis: Howard W. Sams & Co., 1990.
- Don Davis and Carolyn Davis. Appendix II, Recommended Wiring Practices. Sound System Engineering, 2nd Edition. Indianapolis: Howard W. Sams & Co., 1989.

2. Equipment Housing Cabling and Wiring:Lace, tie, or harness wire or cable as required herein, and in accordance with accepted professional practice. Dress, lace or harness all wire or cable to prevent mechanical stress on electrical connections; no wire or cable shall be supported by a connection point. Install cable and wire neatly tied in manageable bundles with cable lengths cut to minimize excess cable slack but still allow for service and testing. Provide horizontal support bars if cable bundles sag. Reference photos below for standard of quality.

a. Provide adequate service loops so that equipment mounted on rack slides may be pulled fully out, to their locked position without straining cable.

b.

c. Neatly bundle excess AC power cable from housing mounted equipment with plastic cable ties.

d. Provide plastic cable ties or Velcro straps to bundle cabling and wiring. Electrical tape and adhesive backed cable tie anchors are not acceptable.

e. Install with connections completely visible and labeled.

f. Provide termination resistors, if required, of 5 per cent tolerance; fully visible and not concealed.

B. Installation of connectors, plates & panels:

a. Install panel mounted connectors rigidly attached to panels, plumb and level.

b. Custom rack panels shall be 1/8 inch thick aluminum, standard EIA sizes, brushed black anodized finish (brushed in direction of aluminum grain only), unless otherwise noted.

c. Custom connector plates (speaker, microphone, etc) are typically stainless steel, unless otherwise noted or specified. However, verify plate

finish with the Architect.

d. Install XLR type connectors in accordance with IEC-268 standard, with a wiring scheme of pin 2 hot (high), pin 3 (low), and pin 1 screen (shield).
e. Other Plates and Panels may be required to satisfy the requirements of the Work.

C. Installation power and grounding:
   a. Coordinate final connection of power and ground wiring to housings.
   b. Hardwire power wiring directly to internal AC receptacles to ensure uninterrupted operation.
   c. Provide 3-conductor, isolated ground, 120 VAC outlets as required within each housing. Provide a minimum of two spare outlets in each rack.
   d. Provide a copper ground buss top to bottom in each housing, insulated from the housing. Ground equipment chassis not having a three wire power cord to these busses using 6/32 nuts, bolts and lock-washers with No. 12 wire. Connect green ground wire from each AC outlet in housing to this buss bar.
   e. Replace manufacturers supplied 18 gauge IEC power cords with UL listed 18 gauge pre-molded 6", 12", 18", or 24". Use minimum length required. No looped or cable tied IEC power cords will be permitted within the equipment rack.
   f. Replace manufacturers supplied 14 gauge IEC power cords with UL listed 14 gauge pre-molded 18" or 36" for all equipment IEC capable. Use minimum length required and minimize looped or cable tied IEC power cords present in the equipment rack.
   g. Installation of electronic equipment:
   h. Take appropriate precautions against electrostatic discharge (ESD). Establish a personal ground before handling electronic equipment through the use of a grounded wrist wrap and/or an anti-static floor pad.
   i. Take appropriate precautions to protect the equipment from damage during installation. Equipment to be installed free of damages, scratches, dents, etc.
   j. Mount trim potentiometers, custom circuit cards, relays, and transformers (except large 70V units) in shielded enclosures, and mark their function and connections with engraved lamicoid labels.
   k. Mount equipment plumb and level, firmly and safely held in place.

D. Installation of equipment housing:
   a. Mount equipment in racks and consoles and fully wire and test before delivery to job site. If field conditions prevent prior assembly of racks, notify Owner in writing that racks will be fabricated on site and the reasons for the change.
   b. Provide rear support for housing mounted equipment greater than 15 inches deep.
   c. Provide blank panels to fill unused panel space within the equipment housing.
   d. If Key door locks are required, key each housing type alike.
   e. Looking at the rack from the rear, locate AC power and speaker wiring on the left; line level audio, video, and RF wiring on the right.
   f. Provide shaft locks or security covers on non-user operated equipment having front panel controls. These panels are to be installed at the conclusion of testing.
   g. If forced air active thermal management is used, provide ventilation blocking material on the front, sides, and rear of the equipment rack as needed. Reference Middle Atlantic Products "Controlling the Temperature Inside Equipment Racks".
   h. Panels or equipment mounted on the rear rack rails shall not block access to any front mounted components.
   i. If equipment rack is not equipped with casters, provide two inch high wood base to isolate equipment rack from floor. Wood base should be capable of supporting the load.

A. Installation of loudspeakers:
   a. Loudspeakers shall be mounted at the operating position in a safe, secure and permanent manner.
   b. Rigging, mounting and support systems for loudspeakers shall be reviewed and certified by a registered Professional Engineer (PE) licensed to practice in the

State in which the project is located. Documentation shall be included as a submittal item. Once the systems are installed, the PE shall physically inspect the methods and means used to verify compliance with the original design.

c. Paint speakers, supports and related hardware color as directed by Architect.
d. The aiming direction of all loudspeakers shall be adjustable by ±5 degrees vertically.
e. Structural support members to have a safety factor of at least five. Mounting hardware and wire rope to have a safety factor of eight. All fasteners to be graded and certified for use in the intended applications. Overhead suspension hardware shall comply with ASME B30.20 standards and all applicable local building and safety codes. Overhead suspension hardware must be of a type that includes product traceability controls.
f. Provide safety cable on all bracket mounted loudspeakers.
g. All loudspeakers located in ceiling tiles shall be located in the center of the tile unless noted otherwise.

B. Installation of projectors:
   a. Confirm distance of specified projection lens before mounting projector.
   b. Projectors shall be mounted plumb and level at the operating position in a safe, secure and permanent manner.
   c. All hardware required to locate the mount and projector at the required location shall be provided.
   d. Projectors shall be mounted using tamper proof secure hardware.
   e. Contractor may be required to adjust projection screen and lift upper and lower limit switches for projection screens and lifts specified elsewhere and not installed as part of this Contract.

C. Installation of flat panel monitors:
   a. Confirm location before mounting.
   b. Monitors shall be mounted plumb and level at the operating position in a safe, secure and permanent manner.
   c. All hardware required to locate the mount and monitor at the required position shall be provided.
   d. Locate monitor on the center line of the room unless noted otherwise.

3.3 FIRESTOP

A. A fire-stop system is comprised of the item or items penetrating the fire rated structure, the opening in the structure and the materials and assembly of the materials used to seal the penetrated structure. Fire-stop systems comprise an effective block for fire, smoke, heat, vapor and pressurized water stream.

B. All penetrations through fire-rated building structures (walls and floors) shall be sealed with an appropriate fire-stop system. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure). Any penetrating item i.e., riser slots and sleeves, cables, conduit, cable tray, and raceways, etc. shall be properly fire-stopped.

C. Fire-stop systems shall be UL Classified to ASTM E814 (UL 1479) and shall be approved by a qualified Professional Engineer (PE), licensed (actual or reciprocal) in the state where the work is to be performed.

D. A drawing showing the proposed fire-stop system, stamped/embossed by the PE shall be provided to the Owner's Technical Representative prior to installing the fire-stop system(s).

E. All fire-stop systems shall be installed in accordance with the manufacturer's

recommendations and shall be completely installed and available for observation by the local authorities prior to cable system acceptance.

3.4 CONTROL SYSTEM PROGRAMMING

A. Transport Control
   a. Provide standard Stop, Play, Pause, Fast Forward and Rewind for each playback device and menu control for DVD players. Buttons should be arranged in a conventional fashion that will be familiar to the normal user.
   b. The selected control function should be displayed by showing the appropriate button "pressed". It should remain this way until another function is selected.
   c. For devices that will go into a standby mode after a period of time, the control system shall sense this mode and restore normal operating mode once a transport function has been selected. This may require the use of current sensors to determine the state of the unit. No direct user action should be required at the playback device to restore the normal operating mode.

B. Screen/Shade Control
   a. In addition to up-down functions, provide a Stop function to allow the movement to be halted. Once movement has been stopped, the up or down buttons should resume travel in the selected direction.
   b. Control system shall not prevent screen/shade wall controls from being used as well.
   c. Touch panel controls should be readily accessible to the user to permit direct control of shades or screen with having to navigate through multiple control pages.

C. Room Combining
   a. Combining of adjacent areas shall be done through a graphical representation of the physical areas to be combined. Use of a floor plan metaphor is recommended with the graphic oriented correctly with respect to control panel location.
   b. Use buttons or other appropriate objects placed along the common wall to enable the combining function.
   c. When spaces are combined, the graphic appearance of those areas shall change to reflect this configuration. Once an area is separated from a combination, the color of its area should revert to the normal room color.
   d. Common control functions between combined rooms shall be linked, allowing control of the combined area from any one of the touch panels. Examples of common functions include:
      a. background music selection,
      b. background music volume
      c. background music muting
      d. Lighting preset recall
      e. Master volume (not individual channel volume)
   e. When combining adjacent rooms, the control system shall force the common functions to a predetermined default configuration so all rooms have the same configuration.
   f. To avoid unintentional changes, a control panel will not be able to operate a function in a remote location without also operating that same function in the room where the panel is located.

D. Level Control
   a. Objects requiring level adjustment such as volume or tone controls shall be through Up/Down buttons with a graphical representation of the actual level.
   b. Increment of level change to be adjusted for reasonable range without the need to push the Up or Down buttons needlessly.

E. Volume Mute
   a Where the ability to mute the sound is needed, the button shall use the label "Vol

On" and "VOL OFF" instead of Mute and Unmute. When in a "VOL OFF" mode, pushing the "VOL UP" button shall restore the sound and bring the system out of the muted mode.

b. VOL ON/OFF buttons shall change color to indicate the status of the button.

F. Standard Colors
   a. Control functions shall be color coded to add clarity and show relationships between different groups of controls.
   b. The color Red shall be reserved to indicate a fault or abnormal condition.
   c. Green may be used to indicate normal operation, but may be used for standard control colors as well.
   d. Similar controls should maintain the same color scheme across all control pages.
   e. When a function is selected, the graphical depiction of that button should appear to be pressed and its color change to a darker shade of the regular button color.
   f. Color schemes used for background and foreground objects should be selected to be complimentary and provide a consistent theme throughout the control pages.

G. Minimum Button Size and Placement
   a. Minimum visual size of a button is 3/8" wide by 1/4" high.
   b. Spacing between buttons should be no less than 1/16".
   c. Where buttons are immediately adjacent, the active selection area of the button should be reduced to 80% of the visual area of the button.

H. Button Actions
   a. When a function on a control page is selected, that button or visual object associated with that function should change to reflect what has been chosen.
   b. For functions that are momentary selections (i.e. VOL UP), the change of state is visible for as long as the button is being pressed.
   c. For function that are maintained selections (i.e. PLAY), the change of state remains visible until another function is selected and resets the previous function..
   d. The state change of a button or visible object should depict real-world objects as much as possible including the appearance of the button be pressed inward, change in shade of the original color, but not a change in hue.

I. Labels
   a. Use of simple words or titles are preferred to indicate functionality, navigation and system status.
   b. Use of stylish symbols should be avoided unless their identity is commonly recognized by the general public. Standard symbols for transport functions are acceptable.
   c. Labels should be presented in a clear, sans serif type face that will remain legible on lower resolution touch panels.
   d. Where physical buttons are present along the side of a touch panel, these buttons should be engraved and filled with a contrasting color.

J. Power On/Off
   a. For panels requiring an ON/OFF control, these functions should be linked through current sensors or other methods for the control system to detect the power on condition of the component being controlled.
   b. Powering off a system should not interfere with the ability of a projector to complete its cool down cycle.

K. Look & Feel
   a. Control pages should utilize a clean, elegant but stylish appearance.
   b. Use a common graphical template across all control pages for a consistent look.
   c. The touch screen layout should utilize graphical elements such as drop shadows, gradient fills and transparency to provide a pleasing overall appearance.
   d. Utilize graphical representations of floor plans to convey location information.
   e. Include company logos, icons or watermarks to portray the corporate identity.
   f. Provide clear navigation tools for moving between control pages.

g. Each sub-page should have a “BACK” button to return to the previous page. This button should appear in the same location on each page.
h. Provide a “HELP” button or icon on each user page to provide clear, non-technical instructions on how to use the functions available to regular users.

L. Presets
a. For systems that have different operating modes or configurations, provide the ability to store and recall preset combinations of system settings.
b. Provide a “Preset” page that permits a minimum of five presets to be recalled. Each button to include a label describing the function or configuration associated with that button.
c. Provide the ability for new presets to be stored over previous settings. New preset to be able to change the label to reflect the new or revised configuration.
d. When a preset has been recalled, the control page should indicate the active configuration.

3.5 LABELING OF EQUIPMENT

A. Provide each terminal strip with a unique descriptor and a numerical designator for each terminal. Show terminal strip descriptor and designator on system schematic drawing.
B. Provide logical and legible cable and wiring label permanently affixed for easy identification.
a. Labels on cables to be adhesive strip type covered with clear heat-shrink tubing. Factory stamped heat shrink tubing may be used in lieu of the adhesive strip style.
b. Wiring designator to be an alpha-numeric code unique for each cable. Actual cable designation assignments to be determined by Contractor. Add cable designation codes to system schematic drawings.
c. Locate the cable designator at the origination and destination of each circuit within 3 inches of the point of termination or connection. Provide cable designator on circuits with intermediate splice points with an additional suffix to indicate each segment.

3.6 ENGRAVING

A. Text font: 1/8 inch block sans serif characters unless noted otherwise.
B. On dark materials, provide white characters; on stainless steel or brushed natural aluminum plates, or light-colored materials, provide black characters.
C. Provide at least two lines of text with first line listing the general device name, e.g., amplifier. Second line to include schematic reference of the device, e.g., AMP-1.
D. Equipment label: black with white characters except where indicated.
E. Thirty days prior to start of testing, provide a list to the Owner of test equipment make, model numbers and calibration dates that will be used.
F. The following equipment shall be available on site for the entire test period through final system testing.
a. Sound Level Meter : ANSI S1.4-1971 Type S1A with digital or analog display. Meter to provide ranges of 40 to 120 dBA.
b. Pink Noise Source - Equal energy per octave bandwidth 20 Hz to 20,000 Hz, ±1 dB (long-term average) at 0 dBm output. Stability: ±2 dB per day.
c. Dual-trace oscilloscope - 100 MHz bandwidth, 1 mV/cm sensitivity.
d. Impedance Meter - Capable of testing audio lines at three frequencies, minimum, between 250 Hz and 5k Hz. Measurement Range: 1 ohm to 100 kohms.
e. Audio Oscillator: bandwidth 20 Hz to 20k Hz ±.5 dB at 0 dBm output. Output to be balanced. Oscillator to include adjustable output level over the range from –30 dBu to +10 dBu.
f. Multimeter - Measurement range, DC to 20k Hz, 100 mV to 300 V, 10 ma to 10 A, dB.
g. NTSC Test generator
h. Real time analyzer with LED or CRT display. The unit shall meet the filter

requirements of ANSI S1.11 Class III for one third octave filters.

i. Video (analog) test generator capable of generating signal up to 1920 x 1200 with audio.

j. Video (digital) test generator capable of generating signal up to 1920 x 1200 with audio.

k. Ladders and scaffolding necessary to inspect elevated equipment, junction boxes, etc.

G. Provide three portable VHF or UHF business band radios for use during acceptance testing with transmission range sufficient to cover entire project. Include rechargeable batteries and recharger along with holster for wearing on belt. Radios to be available for duration of testing process, including any follow-up visits required prior to final acceptance.

3.7 INSTRUCTION OF OWNER PERSONNEL

A. Provide 8 hours instruction to Owner designated personnel focusing on the use, operation and maintenance of the systems, scheduled as a minimum of two separate sessions, by an instructor fully knowledgeable and qualified in system operation. The System Reference Manuals should be complete and on site at the time of this instruction. Coordinate schedule of demonstration with Owner's Representative.

A. Video record all training sessions and compile a training video to be provided to the Owner on DVD.

B. Provide sign in sheet to document the attendee's presence.

C. If Contractor is not properly equipped to conduct Owner training on particular equipment, arrange for factory representatives of the equipment to be present to provide training at no additional cost to the Owner.

3.8 CLEANUP AND REPAIR

A. Upon completion of the work, remove refuse and rubbish from and about the premises. Leave areas and equipment clean and in an operational state. Repair any damage caused to the premises by the installation of systems at no cost to the Owner.

END OF SECTION 27 41 00

SECTION 27 41 16 - INTEGRATED AUDIO/VIDEO SYSTEMS AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Integrated Audio-Video Systems and Equipment as part of the Work.

1.2 RELATED DOCUMENTS

A. General provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections apply to this section.

B. Reference the Project Manual for related specification sections.

C. Reference the Project Drawings for additional information.

1.3 SECTION INCLUDES

A. Project instructions for the Contractor and System description details

B. System product description

C. Project completion instructions for the Contractor

1.4 RESPONSIBILITY

A. Responsibilities include, but are not limited to, the following items:
   1. Provide materials, equipment, transportation, and labor necessary for a fully working, tested, and calibrated system. Supply accessories and minor equipment items (such as, but not limited to, power strips, adapters, connectors, mounting hardware, etc.) needed for a complete system, even if not specifically mentioned in these Specifications. Notify the Architect of any discrepancies in part numbers or quantities before bid. Failing to provide such notification, supply items and quantities according to the intent of the Specification and Drawings, without claim for additional payment.
   2. Specifications and drawings are complementary. Work called for by one is binding as if called for by both. Any discrepancies between specifications and drawings shall be brought to the attention of the Architect for clarification during the bidding period. No allowance shall subsequently be made to the Contractor by reason of their failure to have brought said discrepancies to the attention of the Architect.
   3. Execute work in accordance with the National Electrical Code (NEC), the National Electrical Safety Code, the Occupational Safety and Health Act (OSHA), applicable State and Local codes, ordinances, regulations, authority having jurisdiction (AHJ), and manufacturer's recommendations. If a conflict develops between the contract documents and the appropriate codes and is reported to the Architect prior to bid opening, the Architect will prepare the necessary clarification. Where a conflict is reported after contract award, propose a resolution of the conflict and, upon approval, perform Work.
   4. Required licenses, insurance and permits including payment of charges and fees
   5. Verification of dimensions and conditions at the job site.
   6. Coordinate location and installation of equipment with other building elements.
   7. Preparation of submittal information
   8. Pick-up of Owner Furnished Equipment (OFE) and incorporation into project if applicable.
   9. Development and implementation of control system software code and control panel layouts, which will become the property of the Owner

10. Final tests and adjustments, written report, and documentation
11. Instruction of operating personnel
12. Provision of manuals
13. Maintenance services and warranty.

1.5 REFERENCES

A. Published specification standards, tests or recommended methods of trade, industry or governmental organizations apply to Work in this section where cited below:
1. American National Safety Institute (ANSI)
2. American Society of Testing and Materials (ASTM)
3. Electronics Industries Association (EIA)
4. Federal Communications Commission (FCC)
5. National Electrical Manufacturer's Association (NEMA)
6. National Electrical Code (NEC)
7. Underwriters Laboratories (UL)
8. Occupational Safety and Health Administration (OSHA)
9. Society of Motion Picture and Television Engineers (SMPTE)
10. Building Industry Consulting Service International (BICSI)
11. Davis and Davis, Sound System Engineering (3rd Edition) (SSE), Howard W. Sams, 2006
12. Giddings, Audio System Design and Installation (ASDI), Howard W. Sams, 2013
13. AV Installation Handbook Second Edition: The Best Practices for Quality Audiovisual Systems, Infocomm (AVIH), 2009

1.6 DEFINITIONS

A. In addition to those Definitions of Division1, the following list of terms as used in this specification shall be defined as follows:
1. Furnish - To purchase, procure, acquire, and deliver complete with related accessories.
2. Install – To set in place, join, attach, link, set up or otherwise connect together and test until complete before turning over to the Owner, all parts, items, or equipment supplied by Contractor.
3. Provide – To furnish and install.

1.7 DESCRIPTIONS & REQUIREMENTS

A. The following is intended to further describe the Work and clarify design intent and is not an exhaustive description of the systems.

B. Black Box
1. Audio Sources
   a. Provide an assortment of dynamic / condenser and cardioid microphones.
   b. Provide a wireless microphone system.
   c. Provide a rack mounted multi-media player for music playback.
   d. Provide wired and wireless media connectivity.
   e. Provide cabling and equipment accessories.
2. Mixing System
   a. Provide a rack mounted digital mixer.
3. Processing and Amplification
   a. Provide DSP amplification for room loudspeakers.
4. Loudspeakers
   a. Provide loose loudspeakers with pipe-clamps for mounting to the pipe grid.
   b. Provide cabling connections around the room for loudspeaker connections at the pipe grid and portable equipment rack at the floor.
5. Equipment Housing

a. Provide a portable equipment rack for housing mixer, amplifier, and playback equipment.

6. Production Intercom
   a. Provide an analog production party line system.
   b. Provide wired connections around the room.
   c. Provide connection to flush-mounted speaker stations in talent spaces including shops.
   d. System to be combinable with production intercom installed in adjacent spaces.
7. Hearing Assist
   a. Provide a wireless, single channel radio frequency hearing assist system.
   b. System must operate on approved FCC frequencies.
   c. Provide enough portable receivers to meet current ADA standards including:
      1) Ear speakers
      2) Headsets
      3) Inductive coil loops

1.8 SUBMITTALS

A. Provide submittals in accordance with Conditions of the Contract and Division 1, Submittal Procedures section unless otherwise indicated.

B. Submittals shall contain sufficient information to describe the Work to be performed. Reviewed shop drawings are to be used for final coordination and construction.

C. Shop drawings must be original work produced by the Contractor responsible for performing the work defined in this specification. Scanning, photographic copying, materially copying, or any other reproducing the contents of the drawings or specifications contained within the Contract Documents will be marked as unacceptable and not reviewed for any content. No claim shall be made for delay, undue burden, or additional costs for the effort to produce shop drawings, schedules, and equipment lists addressing this specification or the overall project manual.

D. Supplementary submittal requirements:
   1. Provide the following in one electronic submission for review within thirty days of issuance of Notice to Proceed (NTP) and prior to commencement of Work:
      a. Complete schedule of submittals.
      b. Chronological schedule of Work in bar chart form.
      c. Product Data Sheets:
         1) Provide a complete table of contents with the following information:
         2) Project title.
         3) Submittal number. In the case of a resubmittal, use the original submittal number immediately followed by the suffix “R” immediately followed by a unique number and be numbered in consecutive order.
         4) Date of submission.
         5) Provide a list of and Manufacturer's data sheets on products to be incorporated with the Work. Arrange data sheets in the same order they appear in this specification. Where a data sheet shows more than one product, indicate the model being proposed with an arrow or other appropriate symbol.
         6) Submit manufacturer’s product literature for each type of firestop material to be used. Literature shall include documentation of UL classifications or approved third party testing. Manufacturer’s name and number for each part shall be included. Submit drawings of through penetrations, which include the system to be utilized for the firestopping application. Drawing shall indicate construction of wall or floor assembly; size, number and material of penetrating items; firestop system designation; required F-rating, T-rating and remarks.

7) Upon Owners and/or Consultant's request provide (3) three copies of the submittals. Bind submittal in titled three ring D style binders sized for 150 per cent of the material. Maximum size: three-inch spine. Use multiple volumes as required. Separate major grouping with labeled binder tabs.
8) Submissions that do not follow the format and configuration described above will be returned without review.

d. Shop Drawings:
1) Functional Diagrams/Schematics:
a) Detailed wiring diagrams showing interconnection of components and products, wiring and cabling diagrams depicting cable types and designators, and device designators for each system. Provide connector designations and terminal strip identification, along with color codes for cables connecting to these devices. Give each component a unique designator and use this designator consistently throughout the project.
2) Coordination Drawings:
a) Prepare and submit a set of coordination drawings showing major elements, components, and devices of the audio and video system in relationship with other building components. Prepare drawings to an accurate scale of 1/8"=1'-0" or larger on suitable sized media.
b) Prepare floor plans, reflected ceiling plans, elevations, sections, and details to conclusively coordinate and integrate all equipment. Indicate locations where space is limited, and where sequencing and coordination of installations is of importance to the efficient flow of the Work including but not necessarily limited to the following:
(1) Equipment housings
(2) Ceiling and wall mounted devices
(3) Raceways
(4) Cabling

e. Equipment: Location of equipment within racks, consoles, or on tables, with dimensions; wire routing and cabling within housings; AC power outlet and terminal strip locations.

f. Patch panel(s): Layouts and designation (labeling) strips, including color schemes.

g. Full fabrication details of any custom enclosures and millwork indicating size, material, finish and openings for equipment.

h. Structural rigging and mounting details:
1) Loudspeaker rigging, suspension, and mounting detail drawings shall be signed and sealed by a professional engineer licensed to practice in the state in which the project is located. The signed and sealed drawings noted above to include the following:
a) Analysis of all components in the load path and attachment method to building structure for suspended loudspeakers.
b) Attachment method for mounting brackets at ceilings, walls, or other building features.
c) Detail the product manufacturer, part numbers, and load capacity of the hardware fittings and materials selected for suspended or mounted loudspeakers.
d) A copy of the design calculations.
e) Secondary steel required for attachment to the building structure.
f) Custom brackets, mounts, suspension grids or trusses, loudspeaker cabinet frames, or loudspeaker brackets.
g) Loudspeaker brackets or mounts provided by the specific loudspeaker manufacturer being installed that do not include traceability data.
2) Risk analysis data as referenced in Part 3.2, F
3) Stamping Engineer post-installation sign-off as described in Part 3.2, F

4) Proof of ETCP certification for on-site rigging crew.

i. Projector, loudspeaker, camera mounting details, include hardware types and load capacity.

j. Fabricated Plates and Panels

1) Provide complete drawings on custom fabricated plates or panels. Drawings shall include dimensioned locations of components, component types, engraving information, plate material and color, and bill of material.

k. Labeling

1) Equipment and cabling labeling scheme. Include font sizes and styles, explanation of scheme, and designator schedule.

l. Schedules

1) Wiring schedule showing source and destination of wiring and indicating which wiring is in conduit. Junction box schedule showing type of box, size, mounting and location. Include this information with remainder of wiring diagrams.

m. Control System Software

1) Provide electronic copies of proposed control system user interfaces within sixty (60) days of issuance of Notice to Proceed (NTP).

n. IP Addresses

1) Coordinated with the venue IT Administrator, provide a list of IP addresses, by device, used in the project.

o. Consultant’s project documents in electronic format will not be supplied to the Contractor for their use as part of submittals.

p. Detail drawings executed at an appropriate scale, but not smaller than 1/8 inch = 1’–0”.

q. Submissions that do not follow the format and configuration described above will be returned without review.

r. Any other pertinent data which is necessary to provide the Work.

2. Control System Software:

a. Provide electronic copies of proposed control system user interfaces within sixty (60) days of issuance of Notice to Proceed (NTP).

E. Resubmission requirements:

1. Make all requested corrections or change in submittals required. Resubmit for review until no exceptions are taken.
2. Indicate all changes that have been made other than those requested.

1.9 CONTRACT CLOSE-OUT DOCUMENTS:

A. Provide submittals in accordance with Conditions of the Contract and Division 1, Submittal Procedures section unless otherwise indicated, after substantial completion but prior to final observation:

B. Supplementary submittal requirements:

1. Provide the following in one electronic submission for review.

a. Equipment Manuals:

1) Manufacturer's owner/instruction manual for each type of Product by manufacturer and model or part number unless specified otherwise herein
2) Supply manufacturer’s serial numbers for each Product
3) For custom circuits or modifications, a description of the purpose, capabilities, and operation of each item
4) Separately bind list by manufacturer and model or part number of Products incorporated within the Work, arranged in alpha numeric order. When applicable, bind Manufacturer's warranty statements separately.

b. Test Reports: Recorded findings of Commissioning.

c. Signed copy of turn over equipment to Owner including quantity, make and model.

d. Copy of any program or hardware setup files.
e. System Operation and Instructions: Prepare a complete and typical procedure for the operation of the equipment as a system, organized by subsystem or activity.
    1) This procedure should describe the operation of system capabilities.
    2) Assume the intended reader of the manual to be technically inexperienced but unfamiliar with the components and the facility.
f. Provide Consultant with copy of Owner training video.
g. Service Information, including service phone number(s) and hours; service schedule; description of products recommended or provided for maintenance purposes, and instructions for the proper use of these products.
h. Any other pertinent data generated during the Project or required for future service.
i. Within three (3) weeks of final observation, submit the following in one electronic submission for review. Upon Owners and/or Consultant's request provide (3) three copies of the following:
    1) Record drawings: Final rendition of Shop Drawings depicting what is actually incorporated within the Work.
    2) Hardcopy full size set of Record drawings.
    3) Three (3) compact disc or DVD's containing Record drawings in AutoCAD editable DWG format and Adobe PDF format. Resolution to be sufficient to permit Owner's technicians to be able to clearly read all notes and text on screen.
    4) One set of signed proof-of-training documents.

2. Submittal Format:
    a. Record Drawings: Drawings executed at an appropriate scale, but not smaller than 1/8 inch = 1'–0".
    b. Segregate documents into separate binders containing data relevant to operational, maintenance, and warranty issues. Appropriately duplicate data within the separate bindings when it will reasonably clarify procedures, e.g., operational data in maintenance binding.
    c. Bind Project Record Manual in titled three ring D style binders sized for 150 per cent of the material. Maximum size: three inch spine. Use multiple volumes as required. Separate major grouping with labeled binder tabs.

C. Resubmission requirements:
1. Make all requested corrections or change in submittals required. Resubmit for review until no exceptions are taken.
2. Indicate all changes that have been made other than those requested.

1.10 CUSTOM SOFTWARE

A. Introduction:
1. Proprietary software provided for the Technical Systems shall be subject to this software license between the Contractor and the Owner as an essential element of the system as defined in the system specification and associated documents, drawings and agreement.
2. Contractor shall agree that 3rd party proprietary software provided with the system shall be subject to this agreement.
3. Contractor and Owner agree that this software license is deemed to be part of, and subject to, the terms of the Agreement applicable to both parties; and shall supersede any standard manufacturer or Contractor's standard license agreement.
4. Proprietary software shall be defined to include, but not be limited to, device and system specific software and firmware designed to run on conventional computer based operating platforms as well as all micro-processor based hardware used to program, setup, or operate the system or its components.
5. For sake of this agreement, MS Windows® shall not be considered "proprietary" software, unless a non-public version of Windows® or any of its components are critical to the operation of the system in which case it shall be deemed proprietary.

B. License Grant and Ownership:
   1. Contractor hereby grants to Owner a perpetual, non-exclusive, site license to all software for Customer's use in connection with the establishment, use, maintenance and modification of the system implemented by Contractor. Software shall mean executable object code of software programs and the patches, scripts, modifications, enhancements, designs, concepts or other materials that constitute the software programs necessary for the proper function and operation of the system as delivered by the Contractor and accepted by the Owner.
   2. Except as expressly set forth in this agreement, Contractor shall at all times own all intellectual property rights in the software. Any and all licenses, product warranties or service contracts provided by third parties in connection with any software, hardware or other software or services provided in the system shall be delivered to Owner for the sole benefit of Owner.
   3. Owner may supply to Contractor or allow the Contractor to use certain proprietary information, including service marks, logos, graphics, software, documents and business information and plans that have been authored or pre-owned by Contractor. All such intellectual property shall remain the exclusive property of Owner and shall not be used by Contractor for any purposes other than those associated with delivery of the system.

C. Copies, Modifications, and Use:
   1. Source code shall be available to Owner for a period of not less than 10 years.
   2. Owner may make copies of the software for archival purposes and as required for modifications to the system. All copies and distribution of the software shall remain within the direct control of Owner and its representatives.
   3. Owner may make modifications to the source code version of the software, if and only if the results of all such modifications are applied solely to the system. In no way does this Software License confer any right for Owner to license, sublicense, sell, or otherwise authorize the use of the software, whether in executable form, source code or otherwise, by any third parties.
   4. All express or implied warranties relating to the software shall be deemed null and void in case of any modification to the software made by any party other than Contractor.

D. Warranties and Representations:
   1. Contractor represents and warrants to Owner that:
      a. It has all necessary rights and authority to execute and deliver this Software License and perform its obligations hereunder and to grant the rights granted under this Software License to Owner;
      b. The goods and services provided by contractor under this Software License, including the software and all intellectual property provided hereunder, are original to Contractor or its subcontractors or partners; and
      c. The software, as delivered as part of the system, will not infringe or otherwise violate the rights of any third party, or violate any applicable law, rule or regulation.
   2. Contractor further represents and warrants that, throughout the System Warranty Period, the executable object code of software and the system will perform substantially in accordance with the System Specifications and Agreement. If the software fails to perform as specified and accepted all remedies are pursuant to the policies set forth in the Specification and in the Agreement. No warranty of any type or nature is provided for the source code version of the software which is delivered as is.
   3. Except as expressly stated in this Agreement, there are no warranties, express or implied, including, but not limited to, the implied warranties of fitness for a particular purpose, of merchantability, or warranty of no infringement of third party intellectual property rights.

1.11 QUALITY ASSURANCE

A. Qualifications: Contractor to be experienced in the provision of systems similar in complexity to those required for this project, and meet the requirements listed below. Provide documentation at the time of bid to support these qualifications:
   1. Form of corporation.
   2. No less than three years' experience with equipment and systems of the specified types.
   3. Experience with at least three comparable scale projects within the last three years.
   4. Be a franchised dealer and service facility for the manufacturer's products furnished.
   5. Maintain a fully staffed and equipped service facility with full-time field technicians.
   6. Have at least one supervisory on-site employee who has completed and has been certified CTS-I by Infocomm.
   7. Supervision of all rigging by an ETCP certified rigger for all work associated with suspension or mounting of overhead equipment.
   8. Adequate plant capacity and equipment to complete the Work.
   9. Adequate staff with commensurate technical experience.
   10. Suitable financial status (i.e., bonding and materials purchase capacity) to meet the obligations of the Work.
   11. Adequate regional service organization to meet warranty response requirements of the Project.
   12. Provide listing with appropriate explanation regarding the status of Contractor's resolved or unresolved legal disputes within the last six calendar years.
   13. Provide listing with appropriate explanation regarding any projects within the last 3 years where the Contractor has failed to meet construction schedules due to Contractor's cause.
   14. Completed current version of the AIA Contractor's Qualification Form.

B. Subcontractors: at the time of bid, the Contractor shall provide a list of structural, electrical, sound, or any other subcontractors intended to do the Work, or are being retained as local service providers throughout the warranty period. Subcontractors shall be appropriately state licensed in their specialty and must provide the same qualification documents as the Contractor.

C. Work: Perform Work in compliance with the applicable standards listed herein and governing codes and regulations of the authorities having jurisdiction and the Contract Documents.
   1. Drawings and specification requirements govern where they exceed Code and Regulation requirements.
   2. Where requirements between governing Codes and Regulations vary, the more restrictive provision applies.
   3. Nothing in the Contract Documents grants authority or permission to disregard or violate any legal requirements.

D. Coordinate exact location and installation of equipment, power, grounding, and raceway requirements with the Architect.

1.12 DELIVERY, STORAGE & HANDLING

A. Ship Products in its original container, to prevent damaging or entrance of foreign matter.

B. Handling and shipping in accordance with Manufacturer's recommendation.

C. Provide protective covering during construction of all installed devices, to prevent damaging or entrance of foreign matter.

D. Replace at no expense to Owner, Products damaged during storage, handling or the course of construction.

1.13 PROJECT CONDITIONS

A. Verify conditions on the job site applicable to this work. Notify Architect in writing of discrepancies, conflicts, or omissions promptly upon discovery.

B. The Drawings diagrammatically show cabling and arrangements of equipment fitting the space available without interference. If conditions exist which make it impossible to install work as shown, recommend solutions and/or submit drawings to Architect for approval, showing how the work may be installed.

1.14 WARRANTY

A. Warrant labor and equipment for one year following the date of substantial completion to be free of defects and deficiencies, and to conform to the drawings and specifications as to kind, quality, function, and characteristics. Repair or replace defects occurring in labor or equipment within the Warranty period without charge.

B. This warranty is in addition to any specific warranties issued by manufacturers for greater periods of time.

C. Within the warranty period, answer service calls within twenty four (24) hours during normal working hours and correct the deficiency within forty eight (48) hours.

D. Provide Owner with the name and telephone number of the person to call for service. This information to be part of Project Closeout Documents.

E. Thirty days prior to the end of the warranty period provide a complete checkout of all system components. Repair or replace any defective equipment discovered during the testing. Correct any defects in wiring or other functional problems reported by Owner. Warranty replacement and service of equipment shall not apply to Owner furnished equipment (OFE). Coordinate observation visit with the Owner.

PART 2 - PRODUCTS

2.1 GENERAL

A. Products quantity is as required. If a quantity is given, provide at least the given amount. Some product listed may not be required to fulfill the obligations of the Work.

B. Equipment and materials shall be new and conform to applicable UL or ANSI provisions.

C. Regardless of the length or completeness of the descriptive paragraph herein, provide Products complying with the specified manufacturer's published specifications.

D. Remove or blank out all manufacturers’ names, logos, or other symbols from loudspeakers or other objects placed in view of the public. If logos are removable, remove and repaint to the color of the adjacent surface and reattach.

E. Take care during installation to prevent scratches, dents, chips, etc.

2.2 ACCEPTABLE MANUFACTURERS

A. Model numbers and manufacturers included in this specification are listed as a standard of function, performance, and quality.

B. Refer to General and Supplementary Conditions and Division 1 Specification Sections for equipment substitution procedure.

C. If a specified product has been discontinued by a manufacturer, provide the replacement model (as certified by the manufacturer) at no additional cost.

D. Where required provide manufacturer's rack mount adapter or one manufactured by Middle Atlantic or Winstead unless specified elsewhere.

2.3 MICROPHONES AND ACCESSORIES

A. Wireless Microphone System (WRLS, Type 1-3)
   1. Not specified.

B. Quad Channel Wireless Microphone System (WRLS, Type 4)
   1. Digital wireless system with automatic switching diversity reception
   2. XLR type audio outputs
   3. LED signal strength meters for RF, audio levels, and battery
   4. Frequency coordinated with FCC and local requirements
   5. Rear-mount passive antennas for chosen frequency spectrum
   6. 1-RU rack-mountable
   7. Acceptable Product:
      a. Shure ULXD4Q diversity wireless receiver

C. Bodypack Wireless Microphone (Type 1)
   1. Acceptable Product to include:
      a. Shure ULXD1 Bodypack Transmitter
         1) Shure SB900 Lithium Ion Battery
         2) Shure UL4/C-MTGQ-A Cardioid Lavalier Microphone
         3) Shure MX153 Headset Microphone (coordinate color with owner)

D. Handheld Wireless Microphone (Type 1)
   1. Beta 87A capsule
   2. Acceptable Product to include:
      a. Shure ULXD2/B87A Handheld Transmitter
         1) Shure SB900 Lithium Ion Battery

E. Wireless Microphone Charge Base (Type 1)
   1. 8 Port Wireless Microphone Charging Dock
   2. Acceptable Product
      a. Shure SBC800-US Battery Charger Base

F. Vocal Microphone (Type 1)
   1. Handheld dynamic cardioid pattern
   2. Acceptable Product:
      a. Audix OM6
      b. Shure Beta58a
      c. Approved Equivalent

G. Microphone Stands and Mounting Hardware:
   1. Acceptable Product:
      a. TYPE 1: Round-base floor stands, Black
         1) Atlas MS-10CE w / PB11XEB
         2) Approved Equivalent
      b. TYPE 2: Heavy Duty floor stand, Black

1) Atlas SB11WE
2) Approved Equivalent

c. TYPE 3: Boom Arm Short, Black
1) Atlas PB11XEB
2) Approved Equivalent

d. TYPE 4: Boom Arm Long, Black
1) AtlasPB21XEB
2) Approved Equivalent

e. TYPE 5: Tabletop stand, Black
1) Atlas SMS2B
2) Approved Equivalent

2.4 INPUT SOURCES

A. Media Player (MDP, Type 1)
1. Analog Outputs: XLR balanced, RCA unbalanced
2. Playable Media: CD, SD and SDHC card, USB storage
3. Remote controllable through RS-232C
4. 1-RU rack-mountable
5. USB & aux input
6. Acceptable Product:
a. Tascam CD-400U

B. Mono DI Box (Type 1):
1. Inputs for unbalanced line sources
2. Inputs shall be via ¼” receptacles
3. Line and mic level outputs
4. Ground lift switch
5. Acceptable Product:
a. Whirlwind DIRECTOR
b. Radial ProDI
c. Approved Equivalent

C. Stereo DI Box (Type 1)
1. Inputs for stereo/dual-mono unbalanced line-level sources
2. Inputs shall be via ¼”, RCA, and 3.5mm receptacles
3. Line and mic-level outputs
4. Ground lift switch
5. Acceptable Product:
a. Whirlwind DIRECT2
b. Radial ProAV2
c. Approved equivalent

D. Stereo Computer DI Box (Type 1)
1. Inputs for stereo/dual-mono unbalanced line-level sources
2. Inputs shall be via ¼”, RCA, and 3.5mm receptacles
3. Line and mic-level outputs
4. Ground lift switch
5. Acceptable Product:
a. Whirlwind PC-DI
b. Radial JPC
c. Approved equivalent

E. Stereo Computer USB DI Box (Type 1)
1. Inputs via USB receptacle
2. Mic-level outputs

3. Acceptable Product:
    a. Whirlwind PC-USB
    b. Radial USB-Pro
    c. Approved equivalent

2.5 MIXERS

A. Rack-Mount Mixer (MIXER, Type 1)
1. Acceptable Product:
    a. Allen & Heath SQ-5
        1) SKB 1SKB-RE-SQ5

2.6 POWER AMPLIFIERS

A. General:
1. Two, Four, or Eight channel power amplifier with the EIA standard RS-490 power rating at 1% THD into 70-volt constant voltage load or 8-ohm load as applicable.
2. Provide protection of circuit components in the event of input over-drive, output overload, or short circuits.
3. Frequency response: ±1 dB, 20 Hz to 20 kHz with less than 1 per cent THD at rated output.
4. Input impedance: 10k ohm balanced.
5. Output regulation: 2 dB from no load to full load conditions.
6. Noise generation: at least 85 dB below rated output with input shorted.
7. Front panel operability to be locked upon completion of audio system installation and configuration.

B. Amplifier (Type 1)
1. Configurable power output per channel
2. 300W max continuous power per channel at 8-Ohms
3. 300W max continuous power per channel for 70V circuits
4. Each channel discreetly configurable between low-impedance and 70V/100V
5. Acceptable Product:
    a. Crown CDi 300 Series
    b. LEA CONNECT 35x

2.7 LOUDSPEAKERS

A. General
1. Coordinate loudspeaker colors with Architect.
2. Provide all necessary mounting hardware, brackets, supports and any secondary steel required to attach loudspeaker to building structure.

B. Loudspeaker (Type 1):
1. Surface-mounted loudspeaker
2. Configuration: 8-inch coaxial
3. Frequency Response: 85 Hz – 35 kHz
4. Power Handling: 130W (continuous) @ 8Ω
5. Coverage: 90° conical
6. Acceptable Product to include:
    a. Tannoy VX8 loudspeaker
        1) Tannoy VMY yoke mount
        2) Crosby pipe clamp
        3) VTH Top Hat

C. Speaker Stand (Type 1)
   1. Height adjustable
   2. Supports up to 120 lbs
   3. Acceptable Product:
      a. On Stage SSP7900
      b. Approved Equivalent

2.8 LOUDSPEAKER HARDWARE AND SUPPORT STRUCTURE

A. General:
   1. All rigging truss modules, slings, and hardware to meet a minimum of one of the following standards:
      a. ASME B30.26
      b. ASME B30.9
      c. OSHA 1910.184
      d. OSHA 1926.251
      e. UL 1480 31.3

B. Custom Rigging:
   1. Acceptable Manufacturer:
      a. Polar Focus (reference estimate number [TBD])

C. Speaker Stand (Type 1)
   1. Height adjustable
   2. Supports 120 lbs. at minimum
   3. Acceptable Product:
      a. On Stage SSP7900
      b. Approved equivalent

D. Shoulder Type Machinery Eye Bolts:
   1. Forged Steel - Quenched and Tempered.
   2. Fatigue rated at 1-1/2 times the Working Load Limit at 20,000 cycles.
   3. Product to meet or exceed all the requirements of ASME B30.26 including identification, ductility, design factor, proof load and temperature requirements.
   4. Select size of product based working load limits required.
   5. Acceptable product:
      a. Crosby Group S-279 / M-279 Series

E. Forged Eye Nuts:
   1. Forged Steel - Quenched and Tempered.
   2. Tapped with standard UNC class 2 threads after galvanizing.
   3. Product to meet or exceed all the requirements of ASME B30.26 including identification, ductility, design factor, proof load and temperature requirements.
   4. Select size of product based working load limits required.
   5. Acceptable product:
      a. Crosby Group G-400 Series

F. Anchor Shackles:
   1. Forged - Quenched and Tempered, with alloy pin.
   2. Working Load Limit permanently shown on every shackle.
   3. Hot Dip galvanized or Self-Colored.
   4. Product to meet the performance requirements of Federal Specification RR-C-271D Type IVA, Grade A, Class1.
   5. Select size of product based working load limits required.
   6. Provide all screw pin type shackles with mouse wire.
   7. Acceptable product:

a. Crosby Group G-213 / S-213 Series Round Pin
b. Crosby Group G-209 / S-209 Series Screw Pin

G. Turnbuckles:
1. Acceptable turnbuckle assembly combinations include: Eye and Eye, Jaw and Jaw, Jaw and Eye.
2. End fittings are Quenched and Tempered, bodies heat treated by normalizing.
3. Hot Dip galvanized.
4. Product to meet or exceed all the requirements of ASME B30.26 including identification, ductility, design factor, proof load and temperature requirements.
5. Product to meet the performance requirements of Federal Specifications FF-T-791b, Type 1 Form 1 - CLASS 4, and ASTM F-1145.
6. Select size of product based working load limits required.
7. All end fittings to be moused to the body with mousing cable.
8. Acceptable product:
a. Crosby Group HG-226 Series, Eye and Eye
b. Crosby Group HG-227 Series, Jaw and Eye
c. Crosby Group HG-228 Series, Jaw and Jaw

H. Swivel Hoist Ring:
1. All components are Alloy Steel - Quenched and Tempered.
2. Rated at 100% of Working Load Limit at 90° angle.
3. 360 swivel and 180 pivot action.
4. Product to meet or exceed all the requirements of ASME B30.26 including identification, ductility, design factor, proof load and temperature requirements.
5. Bolt specification to be Grade 8 Alloy socket head cap screw to ASTM A 574.
6. Fatigue rated at 1-1/2 times the Working Load Limit at 20,000 cycles.
7. Zinc Plated (Yellow Chromate) finish for increased corrosion protection.
8. Select size of product based working load limits required.
9. Acceptable product:
a. Crosby Group HR-125

I. Wire Rope Thimble:
1. Product to meet the performance requirements of Federal Specification FF-T-276b Type II.
2. Hot Dip galvanized.
3. Select size of product based wire rope size required for suspended load.
4. Acceptable product:
a. Crosby Group G-411 Series

J. Wire Rope:
1. Strands: 7 x 19 Utility Cable.
2. Type: Galvanized.
3. Select size of product based working load limits required.
4. Acceptable product:
a. Wire Rope Corporation of America (WRCA)

K. Wire Rope Sleeves:
1. Type: Copper Duplex.
2. Select size of product based wire rope size required for suspended load.
3. Acceptable product:
a. Wire Rope Corporation of America (WRCA) SW-740 Series

L. Pipe Clamp:
1. Acceptable Product:
a. The Light Source Mega-Coupler MLB

2.9 ASSISTIVE LISTENING

A. ALS (ALT, Type 1)
   1. Configuration: Single channel
   2. Frequency: 216 MHz
   3. Audio Input: Balanced, mic or line-level, 3-pin XLR
   4. Provide power supply.
   5. Provide 1-RU rack-mount bracket.
   6. Acceptable Product:
      a. Listen LS-71-216, Listen LA-124 remote antenna (where required for outdoor installation)

B. ALS Receiver (Type 1):
   1. Configuration: Single channel
   2. Frequency: 216 MHz
   3. Frequency agile for easy adjustment to various systems
   4. Receivers to be used in all venues.
   5. Include individual price for Owner to purchase additional receivers
   6. Acceptable Product to include:
      a. Listen LR-4200-216 receiver
         1) Listen LA-401 ear speaker
         2) Listen LA-402 headset
         3) Listen LA-430 neck loop

2.10 PRODUCTION INTERCOM

A. Wall Stations (ICS, Type 1):
   1. Two channel speaker station
   2. Visual and audible call signaling.
   3. Mounts in four gang junction box
   4. Acceptable Product:
      a. Clear Com KB-702
         1) Clear Com CC-300

B. Belt Unit (Type 1)
   1. Single channel station
   2. Volume control
   3. Mic on/off button
   4. Call signal button.
   5. Sidetone adjust.
   6. Three pin configuration with loop thru.
   7. Acceptable Product:
      a. Clear Com RS-701
         1) Clear Com CC-300

C. Headset (Type 1)
   1. Single earpiece unit.
   2. Noise cancelling microphone.
   3. Flexible boom arm with 300-degree rotation.
   4. Acceptable Products:
      a. Clear Com CC-300

2.11 POWER SYSTEMS

A. Power Protection with Lights (POWER/LIGHT):
   1. For small or portable rack applications

2. 15 Amp power system.
3. Eight switched AC outlets.
4. Acceptable Product:
    a. Furman Sound PL-8C
    b. Approved Equivalent

B. Power Supplies:
1. As required.

2.12 EQUIPMENT HOUSING AND ACCESSORIES

A. Portable Equipment Rack (Type 1)
1. Size: 8-RU front with 12-RU top
2. Tapped 10-32 rack rails
3. Acceptable Product:
    a. SKB 1SKB19-R1208

B. Rack Blanks (BLANK)
1. Flanged, aluminum panel.
2. Anodized finish.
3. Acceptable product:
    a. Middle Atlantic BL series

C. Rack Vents (VENT)
1. Flanged, aluminum panel.
2. Anodized finish.
3. Acceptable product:
    a. Middle Atlantic VTP series

D. Cable Management
1. Brush grommet panel
2. Acceptable Product:
    a. Middle Atlantic BR series

E. Equipment Rack Screws:
1. Install rack mounted equipment with black 10-32 star post security screws with flat nylon washers.
2. Quantity as required.
3. Provide one spare bit located in a clear plastic bag attached to the inside of each equipment rack in plain view.
4. Acceptable Product:
    a. Middle Atlantic HTX

2.13 PLATES AND PANELS

A. General
1. Provide plates and panels and as described in Drawings. Engrave as shown on Drawings. Other Plates and Panels may be required to satisfy the requirements of the Work.
2. Custom panels shall be 1/8-inch thick aluminum, standard EIA sizes, brushed, anodized finish unless otherwise noted. Brush in direction of aluminum grain only.
3. Plate finish shall be coordinated with the Owner. Plastic plates are not acceptable.
4. Panel, plate and label engraving shall be 1/8-inch block sans serif characters unless noted otherwise. On dark panels or pushbuttons, letters shall be white; on stainless steel or brushed natural aluminum pushbuttons, letters shall be black.

B. Custom and/or Engraved Panels:
   1. Custom panels constructed of 1/8 inch brushed aluminum
   2. Coordinate finishes with Owner
   3. Acceptable Manufacturers:
      a. EMG
      b. RCI Custom
      c. ProCo
      d. Radial Engineering

2.14 CONNECTORS

A. XLR Panel-Mount Connectors
   1. Provide panel-mount XLR connectors with unified metal shell
   2. RF-Protector connectors
   3. Shell color: Black
   4. Contacts: Silver
   5. Terminations: Solder
   6. Acceptable Product:
      a. Male connector: Neutrik NC*MD-L-1-BAG series
      b. Female connector: Neutrik NC*FD-L-1-BAG series

B. XLR Cable Connectors
   1. Provide XLR cable connectors with die-cast shell.
   2. No-screw type assembly
   3. Chuck-type strain relief
   4. Shell color: Black
   5. Contacts: Silver
   6. Terminations: Solder
   7. Acceptable Product:
      a. Male connector: Neutrik NC*MX-L-1-BAG series
      b. Female connector: Neutrik NC*FX-L-1-BAG series

C. BNC Cable Connectors:
   1. Provide cable mount BNC connectors.
   2. Contacts: Brass or copper.
   3. Terminations: Crimp.
   4. Acceptable Product:
      a. Kings
      b. Amp
      c. Amphenol
      d. Canare
      e. Liberty

D. Speaker Connectors
   1. Provide 4 or 8 conductor connector
   2. Shell Color: Black
   3. Terminations: Solder or tab
   4. Acceptable Product:
      a. Neutrik NL4MPXX
      b. Neutrik NL8MPRXX

E. RCA Connectors:
   1. Provide RCA cable connectors with die cast shell
   2. Shell Color: Silver
   3. Contacts: Silver
   4. Terminations: Solder

5. Acceptable Product:
    a. Neutrik
    b. Liberty

2.15 LOOSE CABLES

A. Microphone/Instrument Cables:
1. Cable properties:
    a. Quad 24 gauge stranded with braided shield, flexible hard service jacket.
    b. Color: Black
    c. Each cable to be provided with a Velcro style tie wrap.
        1) Minimum 5/8” width
        2) Length appropriate to wrap minimum 1.5 times around a cable loop of 14-inch diameter.
        3) Standard of performance:
            a) Rip-Tie CABLEWRAP
2. Microphone Cable:
    a. Type 06 – 6 foot, with Gray collar on connector
    b. Type 25 – 25 foot, with Blue collar on connector
    c. Type 50 – 50 foot, with Green collar on connector
    d. Type 100 – 100 foot, with Red collar on connector
3. Instrument Cable
    a. Type 06 - 6 foot, 1/4-1/4
    b. Type 10 – 10 foot, 1/4-1/4
4. Acceptable cable:
    a. Whirlwind MKQ series
    b. Canare StarQuad
    c. ProCo AmeriQuad

B. Microphone Snake (Type 1):
1. 6 Channel
2. Male to Female XLR connectors
3. Acceptable Product:
    a. WhirlwindUSA MS-6-0-NR-075
    b. Approved Equivalent

C. Intercom Cables:
1. Cable properties:
    a. Quad 24 gauge stranded with braided shield, flexible hard service jacket.
    b. Color: Black
    c. Each cable to be provided with a Velcro style tie wrap.
        1) Minimum 5/8” width
        2) Length appropriate to wrap minimum 1.5 times around a cable loop of 14-inch diameter.
        3) Standard of performance:
            a) Rip-Tie CABLEWRAP
2. Intercom Cable:
    a. Type 06 – 6 foot, with Gray collar on connector
    b. Type 25 – 25 foot, with Blue collar on connector
    c. Type 50 – 50 foot, with Green collar on connector
    d. Type 100 – 100 foot, with Red collar on connector
3. Acceptable cable:
    a. Whirlwind MKQ series
    b. Canare StarQuad
    c. ProCo AmeriQuad

D. Speaker Cables:
1. Cable properties:
a. Color: Black,
b. Connector: NL4 to NL4 or NL8 to NL8
c. Wire: 12 gauge stranded, SJ jacket.
d. Each cable to be provided with a Velcro style tie wrap.
1) Minimum 1” width
2) Length appropriate to wrap minimum 1.5 times around a cable loop of 14-18 inch diameter.
3) Standard of performance:
a) Rip-Tie CABLEWRAP
2. Speaker Cable:
a. Type 06 – 6 foot, with Gray collar on connector
b. Type 25 – 25 foot, with Blue collar on connector
c. Type 50 – 50 foot, with Green collar on connector
d. Type 100 – 100 foot, with Red collar on connector
3. Acceptable cable:
a. Whirlwind NL series
b. Approved Equivalent

E. Power Extension Cables:
1. Cable properties:
a. Color: Black
b. 12-gauge, 3 conductor, stranded, flexible hard service jacket.
c. Each cable to be provided with a Velcro style tie wrap.
1) Minimum 1” width
2) Length appropriate to wrap minimum 1.5 times around a cable loop of 14-18 inch diameter.
3) Standard of performance:
a) Rip-Tie CABLEWRAP
2. Power Extension Cable:
a. Type 12 – 12 foot,
b. Type 25 – 25 foot,
c. Type 50 – 50 foot,
d. Type 100 – 100 foot
3. Acceptable cable:
a. ProCo E-Cords series
b. Approved Equivalent

2.16 INSTALLED CABLES & WIRING

A. General
1. All electrical conductors installed under this contract, except where otherwise specified, shall be soft drawn annealed stranded copper having a conductivity of not less than 98% of pure copper, and meet appropriate ratings (e.g. CMR, CMP, etc.)
2. Cable shall carry appropriate fire rating (e.g. CMR, CMP, OFNR, OFNP, etc.) on jacket of cable.
3. Where cables are routed through cable tray, provide tray rated cable of equal specification.
4. Where speaker cables are run exposed through a return air plenum, provide plenum rated cable of equal specification.
5. Shielded cables located in raceways shall have aluminum foil shield with drain wire.
6. The Belden cables listed below are approved for use on this project and are listed to set the acceptable standard of performance. If field conditions or actual cable pathway requires tray or plenum cable, provide version of cable that meets required rating. Cables from West Penn, Windy City Wire, Liberty, Commscope and Gepco are also

acceptable provided they meet the performance specifications of the approved listed cables.

B. Production Intercom Wire
   1. 18 AWG shielded
   2. Cable capacitance to be less than 17 pF/ft
   3. Acceptable Product:
      a. Belden 6340FT
      b. Belden 9207

C. Speaker Level Wire
   1. For applications less than 300W and/or 300 feet
   2. Provide 16 AWG cable.
   3. Cable to be CL3R or CL2P rated.
   4. Jacket color: gray.
   5. Acceptable Product:
      a. Belden 5200UE

2.17 MISCELLANEOUS

A. Headphones (Type 1):
   1. Acceptable Product:
      a. Sony MDR-7506
      b. Shure SRH440
      c. Approved Equivalent

A. Mobile Cabinet: (Type 1) – Microphones / Accessories

   1. Lockable
   2. Steel construction
   3. 4 Drawers
   4. Large 6” casters
   5. Acceptable Product:
      d. Westward 3401NVS-5PU

PART 3 - EXECUTION

3.1 GENERAL

A. Coordinate incorporation of the Work specified herein with other project work so as to facilitate a cohesive final Products.

B. The installation recommendations contained within ASDI and Telecommunications Distribution Methods Manual are mandatory minimum standards and requirements.

C. Mount equipment and enclosures plumb and level.

D. Permanently installed equipment to be firmly and safely held in place. Design equipment supports to support loads imposed with a safety factor of at least five. Seismic bracing shall be installed on appropriate equipment where local codes require such installation.

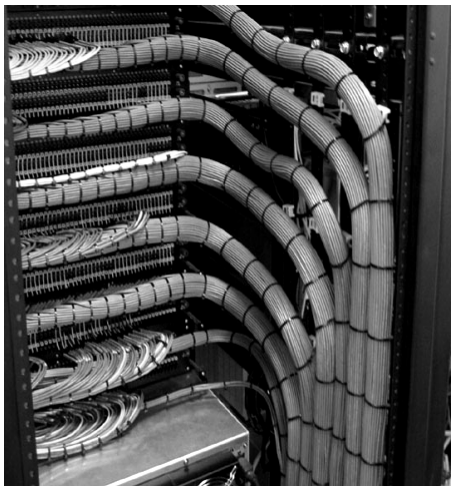
E. Verify all locations of equipment in all rooms with Owner’s Representative, Owner, and Consultant.

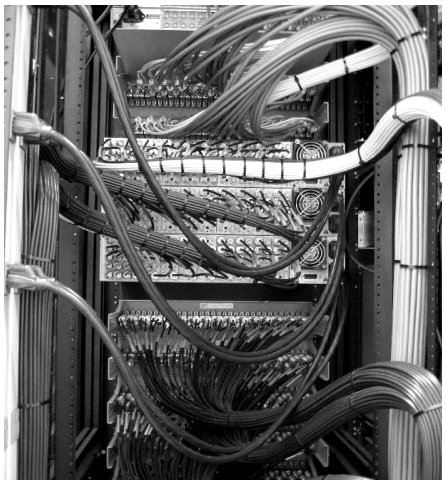
3.2 INSTALLATION

A. Installation of cable and wiring
   1. Cabling and Wiring:
      a. Install cable in a manner to adhere to manufacturer's specifications for maximum cable pulling tension, minimum bend radius, and restrictions.
      b. Provide appropriate support at all horizontal-to-vertical transitions in order to keep the weight of the cable from degrading at the point of transition.
      c. If a J-hook or trapeze system is used to support cable bundles, all horizontal cables shall be supported at a maximum of 48-inch (1.2 meter) intervals. At no point shall the cables rest on light fixtures, acoustic ceiling grids, panels, conduits, sprinkler pipe, water pipe and/or HVAC system ducting.
      d. Horizontal distribution cables shall be bundled in groups of no more than 50 cables when being supported by J-Hook or trapeze systems. Cable bundle quantities in excess of 50 cables may cause deformation of the bottom cables within the bundle and degrade cable performance. An exception to this rule is when cable is installed in cable tray systems.
      e. Cable shall be installed above fire-sprinkler systems and shall not be attached to the system or any ancillary equipment or hardware. The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices
      f. Cables shall not be attached to ceiling grid or lighting fixture wires. Where support for horizontal cable is required, install appropriate carriers to support the cabling.
      g. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced prior to final acceptance at no cost to the Owner.
      h. Cables shall be identified by a self-adhesive machine label in accordance with the System Documentation Section of this specification and ANSI/TIA/EIA-606-A. The cable label shall be applied to the cable behind the faceplate on a section of cable that can be accessed by removing the cover plate.
      i. Unshielded twisted pair cable shall be installed so that there are no bends smaller than four times the cable outside diameter at any point in the run and at the termination field.
      j. Provide splice free wiring and cabling from origination to destination. Cables shall be installed in continuous lengths from origin to destination (no splices). Properly designed transition points, or consolidation points are not considered 'splice' points.
      k. Make joints and connections with rosin-core 60/40 solder or with mechanical connectors specifically intended for the type and class of cable being used. Where spade lugs are used, crimp properly with ratchet type tool.
      l. Take precaution to prevent and guard against electromagnetic and electrostatic hum. For line-level audio signal, float cable shield at one end. Shield not connected to be folded back over cable jacket and covered with heat-shrink tubing. Do not cut off unused shield.
      m. Isolate cables and wires of different signals or different levels; and separate, organize, and route to restrict channel crosstalk or feedback oscillation in any amplifier section. Keep wiring separated into groups for microphone level circuits, line level circuits, loudspeaker circuits, and power circuits.
      n. Connect cable to active components through XLR connections whenever multiple formats are available. Make connections to speaker transformers with properly sized closed end connectors crimped with factory approved ratchet type tool. Wire nut or "Scotchlock" connectors are not acceptable. Do not wrap audio cable splices or connections with adhesive backed tape.
      o. Cover edges of cable and wire pass-through holes in chassis, housings, boxes, etc., with rubber grommets or Brady GRNY nylon grommetting.
      p. Execute wiring in strict adherence to:

1) Phillip Giddings. Audio System Design and Installation. Indianapolis: Howard W. Sams & Co., 1990.
2) Don Davis and Carolyn Davis. Appendix II, Recommended Wiring Practices. Sound System Engineering, 2nd Edition. Indianapolis: Howard W. Sams & Co., 1989.
3) AV Installation Handbook Second Edition: The Best Practices for Quality Audiovisual Systems, Infocomm, 2009

2. Equipment Housing Cabling and Wiring:
   a. Lace, tie, or harness wire or cable as required herein, and in accordance with accepted professional practice. Dress, lace or harness all wire or cable to prevent mechanical stress on electrical connections; no wire or cable shall be supported by a connection point. Install cable and wire neatly tied in manageable bundles with cable lengths cut to minimize excess cable slack but still allow for service and testing. Provide horizontal support bars if cable bundles sag. Reference photos below for standard of quality.





   b. Provide adequate service loops so that equipment mounted on rack slides may be pulled fully out, to their locked position without straining cable.
   c. Neatly bundle excess AC power cable from housing mounted equipment with plastic cable ties.
   d. Provide plastic cable ties or Velcro straps to bundle cabling and wiring. Electrical tape and adhesive backed cable tie anchors are not acceptable.
   e. Install with connections completely visible and labeled.
   f. Provide termination resistors, if required, of 5 per cent tolerance; fully visible and not concealed.

B. Installation of connectors, plates & panels:
   1. Install panel mounted connectors rigidly attached to panels, plumb and level.
   2. Custom rack panels shall be 1/8 inch thick aluminum, standard EIA sizes, brushed black anodized finish (brushed in direction of aluminum grain only), unless otherwise noted.
   3. Custom connector plates (speaker, microphone, etc.) are typically stainless steel, unless otherwise noted or specified. However, verify plate finish with Architect.
   4. Install XLR type connectors in accordance with IEC-268 standard, with a wiring scheme of pin 2 hot (high), pin 3 (low), and pin 1 screen (shield).
   5. Other Plates and Panels may be required to satisfy the requirements of the Work.

C. Installation power and grounding:
   1. Coordinate final connection of power and ground wiring to housings.

2. Hardwire power wiring directly to internal AC receptacles to ensure uninterrupted operation.
3. Provide 3-conductor, isolated ground, 120 VAC outlets as required within each housing. Provide a minimum of two spare outlets in each rack.
4. Provide a copper ground buss top to bottom in each housing, insulated from the housing. Ground equipment chassis not having a three wire power cord to these busses using 6/32 nuts, bolts and lock-washers with No. 12 wire. Connect green ground wire from each AC outlet in housing to this buss bar.
5. Replace manufacturers supplied 18 gauge IEC power cords with UL listed 18 gauge pre-molded 6”, 12”, 18”, or 24”. Use minimum length required. No looped or cable tied IEC power cords will be permitted within the equipment rack.
6. Replace manufacturers supplied 14 gauge IEC power cords with UL listed 14 gauge pre-molded 18” or 36” for all equipment IEC capable. Use minimum length required and minimize looped or cable tied IEC power cords present in the equipment rack.

D. Installation of electronic equipment:
1. Take appropriate precautions against electrostatic discharge (ESD). Establish a personal ground before handling electronic equipment through the use of a grounded wrist wrap and/or an anti-static floor pad.
2. Take appropriate precautions to protect the equipment from damage during installation. Equipment to be installed free of damages, scratches, dents, etc.
3. Mount trim potentiometers, custom circuit cards, relays, and transformers (except large 70V units) in shielded enclosures, and mark their function and connections with engraved lamicoid labels.
4. Mount equipment plumb and level, firmly and safely held in place.

E. Installation of equipment housing:
1. Mount equipment in racks and consoles and fully wire and test before delivery to job site. If field conditions prevent prior assembly of racks, notify Owner in writing that racks will be fabricated on site and the reasons for the change.
2. Secure rack mounted devices utilizing all available fastener mounting positions on device.
3. Provide rear support for housing mounted equipment greater than 15 inches deep.
4. Provide blank panels to fill unused panel space within the equipment housing.
5. If Key door locks are required, key each housing type alike.
6. Looking at the rack from the rear, locate AC power and speaker wiring on the left; line level audio, video, and RF wiring on the right.
7. Provide shaft locks or security covers on non-user operated equipment having front panel controls. These panels are to be installed at the conclusion of testing.
8. If forced air active thermal management is used, provide ventilation blocking material on the front, sides, and rear of the equipment rack as needed. Reference Middle Atlantic Products “Controlling the Temperature Inside Equipment Racks”.
9. Panels or equipment mounted on the rear rack rails shall not block access to any front mounted components.
10. If equipment rack is not equipped with casters, provide two inch high wood base to isolate equipment rack from floor. Wood base should be capable of supporting the load.

F. Installation of loudspeakers:
1. The Contractor is responsible for final design and engineering of loudspeaker rigging, attachments, brackets, and hoisting.
2. Loudspeakers shall be mounted at the operating position in a safe, secure, and permanent manner.
3. Provide custom rigging as needed.
4. Suspension and Mounting:

a. Static and dynamic equipment loads shall be suspended or mounted in compliance with the following ANSI/ESTA standards, using the latest available versions of the standards:
    1) ANSI E1.4-2-2021 Statically Suspended Rigging Systems
    2) ANSI E1.56-2018 Rigging Support Points
    3) ANSI E1.6-1-2021 Powered Hoist Systems
    4) ANSI E1.8-2012 Loudspeaker Enclosures Intended for Overhead Suspension
b. Rigging, mounting, and support systems for overhead suspended loudspeakers shall be reviewed and certified by a registered Professional Engineer (PE), in the employ of the Contractor, licensed to practice in the State in which the project is located. Documentation shall be included as a submittal item. Once the systems are installed, the PE shall physically inspect, at the Contractor's cost, the methods and means used to verify compliance with the original design.

5. General Guidelines:
    a. Paint loudspeakers, supports, and related hardware color as directed by the Owner.
    b. The aiming direction of all loudspeakers shall be adjustable by no less than ±5 degrees horizontally and vertically.
    c. Loudspeakers are to be oriented parallel to their mounting surface unless otherwise noted.
    d. Provide a safety cable connected to a secondary location for each loudspeaker.
    e. All loudspeakers located in ceiling tiles shall be located in the center of the tile unless noted otherwise.
    f. Paint loudspeakers to match surroundings. Confirm color selection with the Architect during the submittal phase.
    g. Exterior loudspeaker cabinets shall be constructed of materials designed for permanent outdoor exposure conditions with a minimum IP 54 rating, and a minimum expected 10-year life span. Exterior and interior surfaces of the cabinets shall be protected from the effects of water, moisture, and humidity. The exterior surface shall also be protected from the effects of ultraviolet radiation to prevent fading and color change. The cabinets shall be shaped and oriented in a manner that minimizes the possibility of water pooling on any cabinet surface. Associated hardware shall be inherently non-corrosive, performing to the standards of 304 Stainless Steel or higher.

G. Loose Equipment
1. Provide loose equipment as indicated on drawings.
2. Unpackage and assemble items.
3. Place items in designated storage or refer to Owner for direction on final location and storage of loose equipment.

3.3 FIRESTOP

A. A fire-stop system is comprised of the item or items penetrating the fire rated structure, the opening in the structure and the materials and assembly of the materials used to seal the penetrated structure. Fire-stop systems comprise an effective block for fire, smoke, heat, vapor and pressurized water stream.

B. All penetrations through fire-rated building structures (walls and floors) shall be sealed with an appropriate fire-stop system. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure). Any penetrating item i.e., riser slots and sleeves, cables, conduit, cable tray, and raceways, etc. shall be properly fire-stopped.

C. Fire-stop systems shall be reviewed by a Professional Engineer (PE) licensed to practice in the State in which the project is located. Stamped drawings showing the fire stop systems shall be included as a submittal item. Once the systems are installed, the engineer of record for the firestop system shall physically inspect the methods and means used to verify compliance with the original design.

D. A drawing showing the proposed fire-stop system, stamped/embossed by the PE shall be provided to the Owner's Technical Representative prior to installing the fire-stop system(s).

E. All fire-stop systems shall be installed in accordance with the manufacturer's recommendations and shall be completely installed and available for observation by the local authorities prior to cable system acceptance.

3.4 CONTROL SYSTEM PROGRAMMING

A. Transport Control
   1. Provide standard Stop, Play, Pause, Fast Forward and Rewind for each playback device and menu control for DVD players. Buttons should be arranged in a conventional fashion that will be familiar to the normal user.
   2. The selected control function should be displayed by showing the appropriate button "pressed". It should remain this way until another function is selected.
   3. For devices that will go into a standby mode after a period of time, the control system shall sense this mode and restore normal operating mode once a transport function has been selected. This may require the use of current sensors to determine the state of the unit. No direct user action should be required at the playback device to restore the normal operating mode.

B. Screen/Shade Control
   1. In addition to up-down functions, provide a Stop function to allow the movement to be halted. Once movement has been stopped, the up or down buttons should resume travel in the selected direction.
   2. Control system shall not prevent screen/shade wall controls from being used as well.
   3. Touch panel controls should be readily accessible to the user to permit direct control of shades or screen with having to navigate through multiple control pages.

C. Room Combining
   1. Combining of adjacent areas shall be done through a graphical representation of the physical areas to be combined. Use of a floor plan metaphor is recommended with the graphic oriented correctly with respect to control panel location.
   2. Use buttons or other appropriate objects placed along the common wall to enable the combining function.
   3. When spaces are combined, the graphic appearance of those areas shall change to reflect this configuration. Once an area is separated from a combination, the color of its area should revert to the normal room color.
   4. Common control functions between combined rooms shall be linked, allowing control of the combined area from any one of the touch panels. Examples of common functions include:
      a. Background music selection,
      b. Background music volume
      c. Background music muting
      d. Lighting preset recall
      e. Master volume (not individual channel volume)
   5. When combining adjacent rooms, the control system shall force the common functions to a predetermined default configuration so all rooms have the same configuration.

6. To avoid unintentional changes, a control panel will not be able to operate a function in a remote location without also operating that same function in the room where the panel is located.

D. Level Control
   1. Objects requiring level adjustment such as volume or tone controls shall be through Up/Down buttons with a graphical representation of the actual level.
   2. Increment of level change to be adjusted for reasonable range without the need to push the Up or Down buttons needlessly.

E. Volume Mute
   1. Where the ability to mute the sound is needed, the button shall use the label “Vol On” and “VOL OFF” instead of Mute and Unmute. When in a “VOL OFF” mode, pushing the “VOL UP” button shall restore the sound and bring the system out of the muted mode.
   2. VOL ON/OFF buttons shall change color to indicate the status of the button.

F. Standard Colors
   1. Control functions shall be color coded to add clarity and show relationships between different groups of controls.
   2. The color Red shall be reserved to indicate a fault or abnormal condition.
   3. Green may be used to indicate normal operation, but may be used for standard control colors as well.
   4. Similar controls should maintain the same color scheme across all control pages.
   5. When a function is selected, the graphical depiction of that button should appear to be pressed and its color change to a darker shade of the regular button color.
   6. Color schemes used for background and foreground objects should be selected to be complimentary and provide a consistent theme throughout the control pages.

G. Minimum Button Size and Placement
   1. Minimum visual size of a button is 3/8” wide by 1/4” high.
   2. Spacing between buttons should be no less than 1/16”.
   3. Where buttons are immediately adjacent, the active selection area of the button should be reduced to 80% of the visual area of the button.

H. Button Actions
   1. When a function on a control page is selected, that button or visual object associated with that function should change to reflect what has been chosen.
   2. For functions that are momentary selections (i.e., VOL UP), the change of state is visible for as long as the button is being pressed.
   3. For function that are maintained selections (i.e., PLAY), the change of state remains visible until another function is selected and resets the previous function.
   4. The state change of a button or visible object should depict real-world objects as much as possible including the appearance of the button be pressed inward, change in shade of the original color, but not a change in hue.

I. Labels
   1. Use of simple words or titles are preferred to indicate functionality, navigation and system status.
   2. Use of stylish symbols should be avoided unless their identity is commonly recognized by the general public. Standard symbols for transport functions are acceptable.
   3. Labels should be presented in a clear, sans serif type face that will remain legible on lower resolution touch panels.
   4. Where physical buttons are present along the side of a touch panel, these buttons should be engraved and filled with a contrasting color.

J. Power On/Off
   1. For panels requiring an ON/OFF control, these functions should be linked through current sensors or other methods for the control system to detect the power on condition of the component being controlled.
   2. Powering off a system should not interfere with the ability of a projector to complete its cool down cycle.

K. Look & Feel
   1. Control pages should utilize a clean, elegant but stylish appearance.
   2. Use a common graphical template across all control pages for a consistent look.
   3. The touch screen layout should utilize graphical elements such as drop shadows, gradient fills and transparency to provide a pleasing overall appearance.
   4. Utilize graphical representations of floor plans to convey location information.
   5. Include company logos, icons or watermarks to portray the corporate identity.
   6. Provide clear navigation tools for moving between control pages.
   7. Each sub-page should have a “BACK” button to return to the previous page. This button should appear in the same location on each page.
   8. Provide a “HELP” button or icon on each user page to provide clear, non-technical instructions on how to use the functions available to regular users.

L. Security
   1. Provide password access to control pages not intended to be accessed by the general public.
   2. Unless otherwise noted, provide a minimum of three levels of access
      a. General User
      b. Non-Technical Employee
      c. AV Technician
   3. Segregate the control functions to only allow authorized individuals access to more sophisticated control pages.
   4. Provide a timeout feature to automatically return the control panel back to the default opening screen after 30 seconds of inactivity. After this reset, passwords must be reentered to return to a previous control page.

M. Presets
   1. For systems that have different operating modes or configurations, provide the ability to store and recall preset combinations of system settings.
   2. Provide a “Preset” page that permits a minimum of five presets to be recalled. Each button to include a label describing the function or configuration associated with that button.
   3. Provide the ability for new presets to be stored over previous settings. New preset to be able to change the label to reflect the new or revised configuration.
   4. When a preset has been recalled, the control page should indicate the active configuration.

3.5 LABELING OF EQUIPMENT

A. Provide each terminal strip with a unique descriptor and a numerical designator for each terminal. Show terminal strip descriptor and designator on system schematic drawing.

B. Provide logical and legible cable and wiring label permanently affixed for easy identification.
   1. Labels on cables to be adhesive strip type covered with clear heat-shrink tubing. Factory stamped heat shrink tubing may be used in lieu of the adhesive strip style.
   2. Wiring designator to be an alpha-numeric code unique for each cable. Actual cable designation assignments to be determined by Contractor. Add cable designation codes to system schematic drawings.

3. Locate the cable designator at the origination and destination of each circuit within 3 inches of the point of termination or connection. Provide cable designator on circuits with intermediate splice points with an additional suffix to indicate each segment.

3.6 ENGRAVING

A. Text font: 1/8 inch block sans serif characters unless noted otherwise.

B. On dark materials, provide white characters; on stainless steel or brushed natural aluminum plates, or light-colored materials, provide black characters.

C. Provide at least two lines of text with first line listing the general device name, e.g., amplifier. Second line to include schematic reference of the device, e.g., AMP-1.

D. Equipment label: black with white characters except where indicated.

3.7 COMMISSIONING

A. Prior to energizing or testing the system, ensure the following:
1. All products are installed in proper and safe manner according to manufacturer's instructions.
2. Insulation and shrink tubing are present were required.
3. Dust, debris, solder splatter, etc. is removed.
4. Cable is dressed, routed, and labeled; connections are consistent with regard to polarity.
5. Labeling has been provided.
6. Temporary facilities and utilities have been properly disconnected, removed and disposed of off-site.
7. Products are neat, clean and unmarred and parts securely attached.
8. Broken work, including glass, raised flooring and supports, ceiling tiles and supports, walls, doors, etc. have been replaced or properly repaired, and debris cleaned up and discarded.

B. Prior to energizing the System verify and perform the following tests and adjustments in compliance with applicable EIA standards.
1. Electronic devices are properly grounded.
2. Test each AC power receptacle with a circuit checker for proper hot, neutral and ground connections.
3. Verify each individual component is operating properly.
4. Verify each individual component's performance meets the manufacturer's published performance for this unit.
5. Measure and record the DC resistance between the technical ground in any equipment rack or console and the main building ground. Resistance should be 0.15 ohms or less.

C. Speaker Circuit Verification Test
1. Measure the impedance of each speaker line leaving the equipment racks.
2. For constant voltage systems measure the impedance at 100 (or 250) Hz, 1 KHz and 8 (or 10) KHz of each line leaving the equipment rack with the line disconnected from the driving source. For band limited devices, use a frequency appropriate for the operating range of the transducer.
3. When documenting the results of these tests, include the calculated impedance based on number of units on a line and the size and distance of the run. Correct any field readings that differ more than 20% from the calculated impedance.
4. Include the results of the tests in the Project Record Manual.

D. Speaker Polarity Verification Test

1. Use an electronic polarity checker, TEF-20, SYSID, SIM II, Smaart, or other similar device to test each loudspeaker. All speakers should have the same relative polarity.
2. Follow manufacturer's recommendations in conducting the tests.
3. Include the results of the tests in the Project Record Manual.

E. Audio Signal Paths
1. Verify operation from each source device through all switching, amplification and distribution devices.

F. System Gain Adjustment
1. Adjust each active device to have proper gain structure from the mixer output to the input of the amplifier.
2. With all amplifiers turned off, connect a sine wave or pink noise generator to the input of the mixer. Using an RMS AC voltmeter with a dB scale, adjust the mixer to an output between -10 and 0 dBu. Once the level has been established, it should remain unchanged throughout the test. All equalizers should be set flat for this test.
3. Follow the signal flow from the mixer to each subsequent component. Measure the input level and output level of each device at the point of connection to the device. The input level reading should differ no more than 0.25 dB from the level recorded for the preceding device. Diagnose and correct the wiring or equipment when any readings exceed this range.
4. Adjust the output of each component to achieve the proper output level.
5. Record the output levels of each device in the Project Record Manual.

G. Signal Delay Adjustment
1. Adjust the delay to each subsystem to ensure proper synchronization between the main speakers and delayed speakers.
2. Using a TEF 20, SYSID, Smaart, SIM II, or other acceptable time based measurement system, measure the arrival time of the distant signal and then measure the arrival of the local signal.
3. Based on the arrival times measured, adjust the delay applied to the local speakers to synchronize them with the distant speakers. Repeat the test to verify the delay has been set to within 1 ms of the arrival of the distant signal. Once the precise delay time has been determined, provide an additional 10 ms of Haas effect delay to maintain directional orientation toward the original sound source.
4. Continue to test and adjust each separate subsystem with a dedicated delay channel.
5. Provide hard-copy printout of each delay adjustment showing first the arrival times with no delay set and then the result after the delay has been adjusted. Record the settings of each delay in the Project Record Manual.

H. Remote Input Verification Test
1. Using a microphone or portable signal generator, connect to each microphone/line level receptacle throughout the facility.
2. Verify that the receptacle under test appears at the correct input and is operating properly.
3. In a similar manner, check all remote tielines and media related lines for correct wiring and labeling.

I. System Equalization
1. Using a RTA, TEF 20, SYSID, or SMAART, equalize all loudspeaker systems to provide a suitable frequency response as follows:
    a. Speech Reinforcement Systems: flat response from 125 Hz to 2.5 KHz, with 2 dB roll off above.
    b. Program Reproduction Systems: flat response from 65 Hz to 8 KHz, with 2 dB roll off above.
2. Verify system gain and amplifier levels.

3. Provide program levels of at least 85 dB and speech reinforcement levels of at least 70 dB in the seating area without objectionable distortion, buzzes, or rattles.
4. Provide hard copy printouts of the spectral response with the test data.

J. RFI and Parasitic Oscillation
1. With systems operating check to ensure that all systems are free from spurious oscillation and radio frequency interference in the absence of audio signal.

K. Buzzes, Rattles and other Distortions
1. Adjust the system for normal operating level in the space. Apply a slow sine wave sweep from 60 Hz to 3 KHz and listen carefully for buzzes, rattles and other objectionable distortions.
2. Correct the cause of the defect. If the cause is not from the system. Bring the cause to the attention of the GC, indicating cause and suggestive corrective actions.

L. Video Systems Test
1. Projected images and screen must be plumb with respect to ceiling line.

M. Video System Tests. Verify performance of all video equipment, components and systems, as specified herein.
1. Video (signal):
   a. S/N (peak to RMS), unweighted DC to 4.2 MHz: 55 dB minimum.
   b. Crosstalk, unweighted DC to 4.2 MHz: 45 dB minimum.
   c. Frequency Response: Within plus to minus 0.5 dB to 4.2 MHz.
   d. Line and Field Tilt: 2% maximum.
   e. Differential Gain: 2% maximum.
   f. Differential Phase: 2 degrees maximum.
   g. Frequency Response: DC to 4.2 MHz within plus or minus 0.5 dB.

N. Video Signal Paths
1. Verify operation from each source device through all switching, amplification and distribution devices.

O. Video Test Report shall include the following:
1. Test Failures and Notices
   a. Sink Device EDID Test – Open items or failures shall not be accepted.
   b. Cable Length Test – Open items or failures shall not be accepted.
   c. HDCP KSV Limitations – Limitations shall not be accepted.
   d. Cable Limitations - Limitations shall not be accepted.
   e. EDID Limitations - Limitations shall not be accepted.
   f. Cable Length Limits exceeded – Failing cables shall not be accepted.
2. Device Model Number, Serial Number, and Firmware Version for main chassis and each input and output card.
3. Device Model Number, Serial Number, and Firmware Version for connected transmitter and receiver devices.
4. EDID – Input Resolution and 3D support status for each input.
5. EDID – Supported Output Resolution and 3D support status for devices connected to each output.
6. EDID – Supported Audio formats for each input.
7. EDID – Supported Audio formats for devices connected to each output.

P. Control Systems
1. Verify operational functions of the control system and all interfaced devices.
2. Verify operational functionality of any wireless user devices.

3.8 CAT5E/CAT6 CABLE CERTIFICATION

A. General Field Test Requirements
   1. All CAT5E/CAT6 cabling links installed as part of this scope shall be tested for the following, in accordance with the field test specifications defines in ANSI/TIA-568-C.2 “Commercial Balanced Twisted-Pair Telecommunications Cabling and Components Standard.” This document will be referred to as the “Category 5e Standard”:
      a. Wire Map
      b. Length
      c. Insertion Loss
      d. NEXT loss
      e. PS NEXT Loss
      f. ACR-F Loss
      g. PS ACR-F Loss
      h. Return Loss
      i. Propagation Loss
      j. Delay Skew
   2. The installed twisted-pair horizontal links shall be tested from terminated end point to terminated end point for compliance with the “Permanent Link” performance specification as defined in the Category 5e Standard.
   3. One hundred percent of the installed cabling links must pass the requirements of the Category 5e standard mentioned above and as further detailed in Section B below. Any failing link must be diagnosed and corrected. The corrective action shall be followed with a new test to prove that the corrected link meets the performance requirements. The final and passing result of the tests for all links shall be provided in the test results documentation in accordance with Section C below.
   4. The test equipment (tester) shall comply with the accuracy requirements for level IIe field testers as defined in ANSI/TIA-1152. The tester including the appropriate interface adapter must meet the specified accuracy requirements. The accuracy requirements for the permanent link test configuration (baseline accuracy plus adapter contribution) are specified in Table 2 of ANSI/TIA-1152 (Table 2 in this TIA document also specifies the accuracy requirements for the channel configuration).
   5. The RJ45 test plug shall fall within the values specified in ANSI/TIA-568-C Annex C for NEXT, FEXT and Return Loss.
   6. The tester shall be within the calibration period recommended by the vendor in order to achieve the vendor-specified measurement accuracy.
   7. The tester interface adapters must be of high quality and the cable shall not show any twisting or kinking resulting from coiling and storing of the tester interface adapters. In order to deliver optimum accuracy, preference is given to a permanent link interface adapter for the tester that can be calibrated to extend the reference plane of the Return Loss measurement to the permanent link interface. To ensure that normal handling on the job does not cause measurable Return Loss change, the adapter cord cable shall not be of twisted-pair construction.
   8. The Pass or Fail condition of the link-under-test is determined by the results of the required individual tests (detailed in Section 4.2.2 of ANSI/TIA-1152). Any Fail result yields a Fail for the link-under-test. In order to achieve an overall Pass condition, the results for each individual test parameter must Pass.
   9. A Pass or Fail result for each parameter is determined by comparing the measured values with the specifies test limits for that parameter.

B. Performance Test Parameters
   1. The test parameters are defined by the Category 5e Standard. The test of each link shall contain all of the following parameters as detailed below. In order to pass the test, all measurements (at each frequency in the range from 1 MHz through 100 MHz) must meet or exceed the limit value determined in the above mentioned standard.
   2. Wire Map - Shall report Pass if the wiring of each wire-pair from end to end is determined to be correct.

3. Length – The field tester shall be capable of measuring length of all pairs of a basic link or channel based on the propagation delay measurement and the average value for NVP. The physical length of the link shall be calculated using the pair with the shortest electrical delay. This length figure shall be reported and shall be used for making the Pass/Fail decision. The Pass/Fail criteria are based on the maximum length allowed for the Permanent Link configuration (90 meters – 295 feet) plus 10% to allow for the variation and uncertainty of NVP.
4. Insertion Loss (Attenuation) – Insertion Loss is a measure of signal loss in the permanent link or channel. The term “Attenuation” has been used to designate “Insertion Loss.” Insertion Loss shall be tested from 1 MHz through 100 MHz in maximum step size of 1 MHz. It is preferred to measure insertion loss at the same frequency intervals as NEXT loss in order to provide a more accurate calculation of the Attenuation-to-Crosstalk Ratio (ACR) parameter. Minimum test results documentation (summary results): Identify the worst wire pair (1 of 4 possible). The test results of the worst wire pair must show the highest attenuation value measured (worst case), the frequency at which the worst case value occurs, and the test limit value at this frequency.
5. NEXT Loss – Pair-to-pair near end crosstalk loss (abbreviated as NEXT loss) shall be tested for each wire pair combination from each end of the link (a total of 12 pair combinations).This parameter is to be measured from 1 through 100 MHz. NEXT Loss measures the crosstalk disturbance on a wire pair at the end from which the disturbance signal is transmitted (near-end) on the disturbing pair. The maximum step size for NEXT loss measurements shall not exceed the maximum step size defined in the Category 5e Standard as shown in Table 1. Minimum test results documentation (summary results): Identify the wire pair combination that exhibits the worst value of NEXT (worst case). NEXT is to be measured from each end of the link-under-test. These wire pair combinations must be identified for the tests performed from each end. Each reported case should include the frequency at which it occurs as well as the test limit value at this frequency.

Table 1 – Maximum frequency step size as defined in ANSI/TIA-1152

Frequency Range (MHz)	Maximum Step size (MHz)
1 - 31.25	0.15
31.26 - 100	0.25

6. PS NEXT Loss – Power Sum NEXT Loss shall be evaluated and reported for each wire pair from both ends of the link under-test (a total of eight results). PS NEXT Loss captures the combined near-end crosstalk effect (statistical) on a wire pair when all other pairs actively transmit signals. Like NEXT this test parameter must be evaluated from 1 through 100 MHz and the step size may not exceed the maximum step size defined in the Category 5e Standard as shown in Table 1. Maximum test results documentation (summary results): Identify the wire pair that exhibits the worst-case margin and the wire pair that exhibits the worst value for PS next. These wire pairs must be identified for the tests performed from each end. Each reported case should include the frequency at which it occurs as well as the test limit value at this frequency.
7. ACR-F Loss, pair to pair – Attenuation Crosstalk Ratio Far-end is calculated from the pair-to-pair FEXT Loss. It shall be measured for each wire-pair combination from both ends of the link under-test. FEXT Loss measures the crosstalk disturbance on a wire pair at the opposite end (far-end) from which the transmitter emits the disturbing signal on the disturbing pair. FEXT is measured to compute ACR-F Loss that must be evaluated and reported in the test results. ACR-F measures the relative strength of the far-end crosstalk disturbance relative to the attenuated signal that arrives at the end of the link. This test yields 24 wire pair combinations. ACR-F is to be measured 1 through 100 MHz and the maximum step size for FEXT loss measurements shall not exceed the maximum step size defined as the standard as in Table 1. Minimum test results documentation (summary results): Identify the wire pair combination that exhibits the worst value for ACR-F. There wire pairs must be identified for the tests performed from each end. Each

reported case should include the frequency at which it occurs as well as the test limit value at this frequency.

8. PS ACR-F Loss – Power Sum Attenuation Crosstalk Ratio Far-end is a calculated parameter that combines the effect of the FEXT disturbance from three wire pairs of the fourth one. This test yields eight wire-pair combinations. Each wire-pair is evaluated from 1 through 100 MHz in frequency increments that do not exceed the maximum step size defined in the standard as shown in Table 1. Minimum test results documentation (summary results): Identify the wire pair that exhibits the worst pair combinations must be identified for the tests performed from each end. Each reported case should include the frequency at which it occurs as well as the test limit value at this frequency.
9. Return Loss – Return Loss (RL) measures the total energy reflected on each wire pair. Return Loss is to be measured from both ends of the link-under-test for each wire pair. This parameter is also to be measured from 1 through 100 MHz in frequency increments that do not exceed the maximum step size defined in the Category 5e Standard as shown in Table 1. Minimum test results documentation (summary results): Identify the wire pair that exhibits the worst value of Return Loss. These wire pairs must be identified for the tests performed from each end. Each reported case should include the frequency at which it occurs as well as the test limit value at this frequency.
10. Propagation Delay – Propagation delay is the time required for the signal to travel from one of the links to the other. This measurement is to be performed for each of the four wire pairs. Minimum test results documentation (summary results): Identify the wire pair with the worst propagation delay. The report shall include the propagation delay value measured as well as the test limit value.
11. Delay Skew – [as defined in the Category 5e Standard; Section 6.2.19] This parameter shows the difference in propagation delay between the four wire pairs. The pair with the shortest propagation delay between the four wire pairs. The pair with the shortest propagation delay is the reference pair with a delay skew value of zero. Minimum test results documentation (summary results): Identify the wire pair with the worst-case propagation delay (the longest propagation delay). The report shall include the delay skew value measured as well as the test limit value.

C. Test Result Documentation
   1. The test results/measurements shall be transferred into a Windows based database utility that allows for the maintenance, inspection, and archiving of these test records. A guarantee must be made that the measurement results are transferred to the PC unaltered, i.e., “as saved in the tester” at the end of each test and that these results cannot be modified at a later time.
   2. The database for the completed job shall be stored and delivered on CD-ROM or DVD including the software tools required to view, inspect, and print any selection of test reports.
   3. A paper copy of the test results shall be provided that lists all the links that have been tested with the following summary information:
      a. The identification of the link in accordance with the naming convention defined in the overall system documentation.
      b. The overall Pass/Fail evaluation of the link-under-test including the NEXT Headroom (overall worst case) number.
      c. The date and time the test results were saved in the memory of the tester.
   4. General information to be provided in the electronic data base with the test results information for each link:
      a. The identification of the customer site as specified by the end-user.
      b. The identification of the link in accordance with the naming convention defined in the overall system documentation.
      c. The overall Pass/Fail evaluation of the link-under-test
      d. The name of the test limit selected to execute the stored test results
      e. The cable type and value of NVP used for length calculations
      f. The date and time the test results were saved in the memory of the tester

g. The brand name, model, and serial number of the tester.
h. The identification of the tester interface
i. The revision of the tester software and the revision of the test limits database in the tester
j. The test results information must contain information on each of the required test parameters that are listed in Section B and as further detailed below under paragraph C5.

5. For each of the frequency-dependent test parameters, the value measured at every frequency during the test is stored. The PC-resident database program must be able to process the stored results to display and print a color graph of the measured parameters. The PC-resident software must also provide a summary numeric format in which some critical information is provided numerically as defined by the summary results (minimum numeric test results documentation) as outlined above for each of the test parameters.
6. The detailed test results data to be provided in the electronic database must contain the following information:
   a. Length: Identify the wire-pair with the shortest electrical length, the value of the length rounded to the nearest 0.1 m330 and test limit value.
   b. Propagation delay: Identify the pair with the shortest propagation delay, the value measured in nanoseconds (ns) and the test limit value.
   c. Delay Skew: Identify the pair with the largest value for delay skew, the value measured in nanoseconds (ns) and the test limit value.
   d. Insertion Loss (Attenuation): Minimum test results documentation as explained in Section B for the worst pair.
   e. Return Loss: Minimum test results documentation as explained in Section B for the worst pair as measured from each end of the link.
   f. NEXT, ACR-F: Minimum test results documentation as explained in Section B for the worst pair combination as measured from each end of the link.
   g. PS NEXT and PS ACR-F: Minimum test results documentation as explained in Section B for the worst pair combination as measured from each end of the link.

3.9 FINAL OBSERVATION & TESTING

A. Upon completion of installation, initial adjustments, tests and measurements specified in Part 3, and submission and review of the results, a final observation and test will be performed by the Owner or Owner’s representative no earlier than two weeks after receipt of the written results.

B. Provide a minimum of one (1) person for observation and testing familiar with aspects of the System to assist the Owner.

C. The process of testing the System may necessitate moving and adjusting certain components.

D. Testing includes operation of each major system and any other components deemed necessary. Perform tests and provide required test equipment, tools and material required to make any necessary repairs, corrections, or adjustments.

E. The following procedures will be performed on each System:
   1. Observation of the methods and means employed to incorporate the System within the facility.
   2. Verification of proper operation, from controlling devices to controlled devices.
   3. Verification of proper adjustment, balance, and alignment of equipment for optimum quality and to meet the manufacturer's published specifications. Establish and mark normal settings for each level control, and appropriately record these settings within the Record Documents.
   4. Other tests on equipment or systems deemed appropriate.

F. In the event the need for further adjustment or work becomes evident during testing, the Contractor is to continue their work until the System is acceptable at no addition to the contract price. If approval is delayed because of defective equipment, or failure of equipment or installation to meet the requirements of these specifications and any extension of the observation and testing period is required, the Contractor shall pay for additional time and expenses of the Owner at the standard rate in effect at that time.

3.10 TEST EQUIPMENT

A. Thirty days prior to start of testing, provide a list to the Owner of test equipment make, model numbers and calibration dates that will be used.

B. The following equipment shall be available on site for the entire test period through final system testing.
1. Sound Level Meter : ANSI S1.4-1971 Type S1A with digital or analog display. Meter to provide ranges of 40 to 120 dBA.
2. Pink Noise Source - Equal energy per octave bandwidth 20 Hz to 20,000 Hz, ±1 dB (long-term average) at 0 dBm output. Stability: ±2 dB per day.
3. Dual-trace oscilloscope - 100 MHz bandwidth, 1 mV/cm sensitivity.
4. Impedance Meter - Capable of testing audio lines at three frequencies, minimum, between 250 Hz and 5k Hz. Measurement Range: 1 ohm to 100 kohms.
5. Audio Oscillator: bandwidth 20 Hz to 20k Hz ±.5 dB at 0 dBm output. Output to be balanced. Oscillator to include adjustable output level over the range from –30 dBu to +10 dBu.
6. Multimeter - Measurement range, DC to 20k Hz, 100 mV to 300 V, 10 ma to 10 A, dB.
7. NTSC Test generator
8. Real time analyzer with LED or CRT display. The unit shall meet the filter requirements of ANSI S1.11 Class III for one third octave filters.
9. Video (analog) test generator capable of generating signal up to 1920 x 1200 with audio.
10. Video (digital) test generator capable of generating signal up to 1920 x 1200 with audio.
11. Ladders and scaffolding necessary to inspect elevated equipment, junction boxes, etc.

C. Provide three portable VHF or UHF business band radios for use during acceptance testing with transmission range sufficient to cover entire project. Include rechargeable batteries and recharger along with holster for wearing on belt. Radios to be available for duration of testing process, including any follow-up visits required prior to final acceptance.

3.11 INSTRUCTION OF OWNER PERSONNEL

A. Provide instruction to Owner designated personnel focusing on the use, operation and maintenance of the systems, scheduled as a minimum of two separate sessions, by an instructor fully knowledgeable and qualified in system operation. The System Reference Manuals should be complete and on site at the time of this instruction. Coordinate schedule of demonstration with Owner’s Representative.
1. Black Box
    a. 2 hours of instruction

B. Video record all training sessions and compile a training video to be provided to the Owner on DVD.

C. Provide sign in sheet to document the attendee’s presence.

D. If Contractor is not properly equipped to conduct Owner training on particular equipment, arrange for factory representatives of the equipment to be present to provide training at no additional cost to the Owner.

3.12 CLEANUP AND REPAIR

A. Upon completion of the work, remove refuse and rubbish from and about the premises. Leave areas and equipment clean and in an operational state. Repair any damage caused to the premises by the installation of systems at no cost to the Owner.

END OF SECTION 27 41 16

SECTION 27 51 00 – INTERCOM SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The drawings and general provisions of the Contract Documents apply to this Section.

1.2 SUMMARY

A. This section includes a fully operational IP platform for a district-wide internal and school Critical Communications Solution, incorporating school safety notifications and general communications including but not limited to the following:

1. The platform shall provide complete internal communications and employ state of the art IP Technology including the minimum functions listed.
   a. Two-way internal intercommunications between staff locations and classrooms.
   b. Scheduled bell events.
   c. Emergency announcements that will override any pre-programmed audio, assuring that all Emergency/Lockdown etc., are heard at each and every speaker location.
   d. Capability of prerecording emergency announcements that can be activated by a Soft Key on an administrative console, panic button, dial string, or web browser.
   e. Atomic Time Synchronization with Class Change Tones utilizing multiple, programmable schedules for each zone.
   f. District-wide, Emergency, Group, All School and Zone live voice paging.
   g. District-wide, Emergency, Group, All School and Zone paging for pre-recorded audio – tones, music and voice.
   h. Web-based user interface.
2. The system shall support a minimum of 1000 level priorities which shall be user-definable, allowing each end point to place a minimum of 5 different priority calls at the same time.
3. Any authorized administrator shall be able to call from outside the school into any classroom, zone, or entire school directly via the School District supplied SIP enabled Telephone Network. This shall allow remote monitoring, call-in annunciation, and two-way conversation from outside the facility as well as paging into the system. (Compliance with NEMA Standard SB-40 for emergency communications in K-12 Schools).
4. Authorized system users shall be able to create a minimum of 100 automated sequences with voice instructions, tones, emails, program distribution, and relay activations and replay them.
5. Automated message strings shall be manually initiated from a single-button access on the console, on a SIP connected telephone, a panic button, from the web-based user interface or via interface with third party systems.
6. Paging and two-way intercom features shall be accessible from any system console or SIP connected telephone for each campus.
7. The platform shall synchronize its system time to the network timeserver or a web-based time server.
8. Each single campus installation shall be locally survivable for intercom, paging, bells, and emergencies such as lockdown, even when the district connection is unavailable.

9. This specification establishes a minimum level of quality, features, and performance for individual components as well as the integrated system.
10. Systems that do not comply with the feature-sets highlighted in this Specification will not be considered.

1.3 DEFINITION OF TERMS

A. Installer(s): Shall refer to the person, persons, or company who or which actually contracts to perform the work specified herein.

1.4 SUBMITTALS

A. Product data for each component.

B. Shop Drawings: Prior to proceeding with the work: Provide detailed equipment assemblies and indicate dimensions, weights, required clearances, method of field assembly, components, location of each field connection, and a complete schedule of all equipment and materials with associated manufacturer's cuts sheets which are to be used.
   a. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring. Identify terminals to facilitate installation, operation, and maintenance. Include a single-line diagram showing cabling interconnection of components and levels throughout system and impedances.
   b. Artwork drawings and lists indicating proposed nameplate nomenclature and arrangements for control panels and plug panels prior to fabrication reflecting equipment used.
   c. Each drawing shall have a descriptive title and all sub-parts of each drawing shall be labeled. All drawings shall have the name and locations of the project, Systems Contractor's name in the title block.
   d. Details and descriptions of any other aspect of the system, which must differ from the contract documents due to field conditions or equipment, furnished.

C. FCC Approval: The system shall be approved for direct interconnection to the telephone utility under Part 68 of FCC rules and regulations. Systems, which are not FCC approved or utilize an intermediary device for connection, will not be considered. Provide the FCC registration number of the system being proposed as part of the submittal process.

D. Product Certificates: Signed by manufacturers certifying that products furnished comply with specified requirements.

E. Installer Certificates: Signed by manufacturers certifying that Installers comply with specified requirements.

F. Manufacturer Certificates: Signed by manufacturers certifying that they comply with specified requirements.

G. Field Test Reports: Indicate and interpret test results for compliance with performance requirements. Include record of final matching transformer-tap settings, and signal ground-resistance measurement certified by Installer.

H. Maintenance Data: For equipment to be included in maintenance manuals specified in Division 1.

a. Record of Owners equipment-programming option decisions.
b. All instructions necessary for proper operation and manufacturer's instructions.
c. "Proof of Performance" information.
d. Manufacturer's maintenance information.
e. Copies of non-proprietary computer programs and system set up disks documenting all programmable features of the installed system.

I. Record Drawings: Prior to final acceptance, provide three (3) complete sets of drawings indicating all cable numbers and construction details in accordance with the actual system installation. Revise all shop drawings to represent actual installation conditions. These Record Drawings will be used during "Final Acceptance Testing".

J. System Training: Submit the following information describing the training programs and system trainers as outlined in paragraph 1.6 of this specification and in accordance with Division 1 specifications.
   a. Include with the submittal a preliminary staff development training program in outline form for review and approval by the owner's representative.
   b. Include with the submittal a current copy of the trainer's certification from the manufacturer that certifies and identifies the trainer(s) who are eligible to provide training and support for the project.
   c. Include with the submittal a current copy of trainer's needs assessment form which will be reviewed with the owner's designated representative for the system's preliminary system programming and configuration.
   d. Include with the submittal copies of all documentation used to identify for the owner those participants attending and completing the training programs.

K. A copy of the manufacturer's standard statement of warranty proving all equipment provided for the school communications network is covered with the required **five-year** warranty shall be included with the project submittal. This statement of warranty shall be provided on the manufacturer's stationary.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced Installer who is an authorized representative of equipment manufacturer for both installation and maintenance of equipment required for this Section. Provide the following within thirty (30) days after notification to proceed:
   1. Provide a list of installations that the Installer has specifically installed for verification by the Owner. Random installations from other vendors and/or Installers shall not be accepted. The Installer, not its employees, must meet these qualifications.
   2. The Installer shall be bondable.
   3. The Installer shall demonstrate to the satisfaction of the Owner or his representative that he has:
      a. Adequate plant and equipment to pursue the work properly and expeditiously.
      b. Adequate staff and technical experience to implement the work.
      c. Suitable financial status to meet the obligations of the work.
      d. Technically capable and factory trained service personnel at a local service facility to provide routine and emergency service for all products used in this project.

B. Any Contractor, who intends to bid on this work and does not meet the requirements of the "Quality Assurance" paragraph(s), shall employ the services of an "Installer" who does

meet the requirements and who shall provide the equipment, make all connections and continuously supervise the installation. A subcontractor so employed as the “Installer” must be acceptable to the Architect/Engineer. The “Installer” shall be identified within thirty (30) days of notification to proceed for acceptance by the Architect/Engineer.

C. Because the life expectancy of this type of communications structure normally exceeds 10 years, the owner expects continuity from the service provider. If the installing/servicing company has not been an authorized provider of the manufacturers product for it least (7) years, the following is required:
    1. A list of (2) systems manufacturers of which they currently are authorized service providers where the relationship exceeds (7) years.
    2. A letter from the manufacturer outlining the details of changes in service providers over the last (7) years and what actions they will take to ensure continuity of service to the customer.

D. Each major component of equipment shall have the manufacturers name, address and model number on a plate securely affixed in a conspicuous place. NEMA code ratings, UL Label, or other data that is die-stamped into the surface of the equipment shall be easily visible.

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

F. Comply with NFPA 70

G. Comply with NEMA Standard SB-40 for Emergency Communications in K-12 schools.

H. Comply with UL 60950.

1.6 IN-SERVICE TRAINING

A. The contractor shall provide and implement a complete and comprehensive staff training program for all administrators, facility staff members, and teachers. This mandatory training program will provide school staff a complete understanding of how to utilize and properly operate all functions.

B. The training program shall be implemented by a staff member/trainer employed by the contractor. The trainer must be factory certified to provide training on their product.

C. All staff development training is to be coordinated through the owner’s designated representative. As training sessions are completed, the trainer will provide the school’s administrative staff and school district’s staff a document listing all of the staff and faculty members who attended, received, and completed the training program.

1.7 WARRANTY

A. Provide a **manufacturer’s five-year warranty** of the school communications network equipment against defects in material and workmanship. This warranty will cover all electronic system components. Additional warranties cover clocks, speakers, and call in switches. If any defects are found within the warranty period, the defective equipment shall be replaced at no cost (equipment only); a one year warranty shall be provided for labor.

B. A copy of the manufacturer's standard statement of warranty proving all equipment provided for the school communications network is covered with the required five-year warranty shall be included with the project submittal. This statement of warranty shall be provided on the manufacturer's stationary. The standard five-year warranty is an important element in establishing a standard in quality. Manufacturers who circumvent the five-year warranty by offering special "extended warranties" that are not part of their normal published warranty will not be accepted.

C. Contractor shall respond, excluding weekends and holidays, within 24 hours to any warranty service calls. If equipment cannot be repaired within 24 hours of service visit, the contractor shall provide "loaner" equipment to the facility at no charge.

D. Make available a service contract offering continuing factory authorized service of the system after the initial warranty period.

1.8 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide the following system:
   1. Telecenter U manufactured by Rauland

PART 2 - PRODUCTS

2.1 SYSTEM REQUIREMENTS

A. The new addition will be connected to the existing on site server. Provide all necessary hardware to allow for new devices to be connected.

B. The platform shall utilize state of the art IP Technology for Call-in Notification, School Safety Paging and Evacuation tones, Atomic Time Synchronization, Class Change Tones utilizing multiple, programmable schedules for each zone, Two-way hands-free Internal Communications and Paging, and Program Distribution. The system shall be easy to learn and operate. All standard programming shall be web-based and user friendly to allow the system administrator the ability to easily program system features.

C. Provide complete and satisfactorily operating district/school communications and district/school safety as described herein, using materials and equipment of types, sizes, ratings, and performances as indicated. Use materials and equipment that comply with referenced standards and manufacturers' standard design and construction, in accordance with published product information. Coordinate the features of all materials and equipment so they form an integrated system, with components and interconnections matched for optimum performance of specified functions.

D. The platform shall be a single electronic system consisting of a minimum of 10 audio channels for each campus, (classroom) IP Speaker Modules and call switches, IP Zone Modules connecting corridor speakers, inside and outside horns, IP Administrative Consoles, SIP enabled PBX integration and district-wide integration for paging, emergency notifications, calendar scheduling and configuration.

E. Each Classroom shall be provided with a Speaker Module interface and a minimum of 5 different call switches, each with their own annunciation path and priority.

F. Call-ins may automatically annunciate (display of priority and location) to administrative consoles, SIP enabled phones, and outside phones.

G. Call-ins shall be programmed to automatically change priority and annunciation route based on age of call-in and original priority.

H. Call-ins may have priority (and annunciation route) changed by user action from a console or SIP enabled phone.

I. Call-in annunciation route shall include playing pre-recorded audio over speakers, sending a pre-configured email, and activating relays.

J. The platform shall lend itself to expansion by simple addition of hardware modules.

K. The platform shall connect directly to an existing, standard protocol WAN/LAN network, without the need for a separate server at each school location. Configuration, including bell schedules, calendars, and emergency sequences can be remotely created, changed, stored and downloaded to the system by an authorized user from a web-based user interface.

L. The platform shall provide the ability to initiate school safety paging announcements, evacuation tones and take cover tones from any telephone or connected web browser within the facility or outside the facility to any other location within the facility or district.

M. The platform shall provide the ability to selectively communicate or monitor individual classrooms in emergency situations from any telephone within the facility or outside the facility to any other location within the facility; all communication within the classroom shall be hands-free and will not require any interaction by the classroom user.

N. The platform shall provide classroom users the ability to confirm that they have safely secured their classrooms during an emergency with a single button press. The front office administrator will receive confirmation that the classroom is safely secured via an administrative console and web-based user interface. The front office administrator can view classrooms that are not safely secured via the administrative console. The front office administrator can view classrooms that are not safely secured via the web-based user interface. The front office administrator shall be able to initiate two-way communication, without a pre-announcement tone, to the classroom during an emergency via the administrative console. Web-based user interface will still identify that a school is in an emergency, even if all classrooms are safely secured. Individual classroom check-in and school emergency status shall be viewed from the web-based user interface, both on-site and remotely.

O. IP Addressable and POE powered Speaker Modules for individual rooms shall be system programmable and may be assigned any two, three, four, five or six digit number as well as name and description. Any extension may be reassigned at any time.

P. IP-enabled two-way voice communication shall be available from any provided telephone or administrative console through any speaker in a campus. This shall allow hands-free communication to any classroom or any individual loudspeaker unit. A programmable pre-announce tone shall sound immediately before the intercom path is opened and a supervisory tone shall continue to sound at regular intervals when speaker monitoring is active, complying fully with all privacy legislation. Pre announce tone and supervisory tones shall be disabled during designated emergencies automatically.

Q. The platform shall allow users to configure multiple schedules per school, with a minimum of 500 unique events per schedule, and automatic Daylight Savings time correction. Schedules can be programmed to occur once, daily, weekly, monthly, or in any combination of the preceding recurrences. Each school may have a minimum of 20 unique bell schedules, with a minimum of 5 active schedules on any given day for each campus. User shall be able to select from 25 standard included tones as well additional user created and uploaded audio files for class change signaling and messaging. In addition, scheduled events shall include relay actions, email notifications, and paging exclusions as system configuration changes. The platform shall allow control of the bell schedules via the district WAN/LAN without the need for a separate server at each school location. Bell schedules can be remotely created, changed, stored and assigned to calendar days for the local school by an authorized user from a web-based user interface.

R. The platform shall be able to integrate with an existing PA system or operate as a fully independent IP solution. The platform shall be able to function in combination of said configurations, and allow for seamless communication within a school or district-wide, regardless of the type of configuration used. The platform shall be scalable, with the ability to easily add, install, and configure additional equipment to a system.

S. The platform allows for customization of preprogrammed sequences, used for emergencies, events, and everyday communications. Preprogrammed sequences can be activated from the push of a relay button, soft key of an administrative console, a dial string of a SIP phone, or a web browser configured to the district network. Sequences can be initiated automatically as part of a schedule or on the fly. Preprogrammed sequences can be customized to utilize any combination of audio tones, emails, relays, tone exclusions, swings, delays, duples, SIP phone notifications, and program distribution. Audio tones can include customized audio files and voice messages, recorded in any language. Uploaded audio tones and messages can be preprogrammed to annunciate repeatedly or individually, as part of a scheduled sequence or on the fly. Each school in a district can have its own customized sequences, and can be activated individually, in groups, or district-wide.

2.2 EQUIPMENT AND MATERIAL

A. Server Software
   1. NOTE NEEDED

B. Campus Controller
   1. NOT NEEDED

C. IP Addressable Modules:
   1. System shall provide multiple IP Addressable Modules for intercom, paging and relay activation.
      a. All Modules are POE 802.3af compliant
      b. All Modules support DHCP.
      c. All Modules connect to network with a single RJ45 connector
   2. IP Addressable Speaker Module
      a. Shall interface to school’s data network, a classroom speaker, and multiple call switches.
      b. A minimum of 5 levels of call-in can be placed from an IP Speaker Module. The call-ins are routed to administrative consoles and select SIP connected telephones and can only be cleared from the system once answered. If a call-in is not answered within a preprogrammed time the call-in may reroute to other telephones, consoles, and speakers.

c. An option for Privacy call in switches is supported. When the Privacy switch is activated it prevents administrative or classroom telephones from monitoring the specific classroom/location intercom speaker.
d. The ability to belong to one or more of a minimum of 100 independent zones for zone paging, program/music distribution zones and class change tone zones; this assignment is a programmable function, changeable by time of day. Each IP Speaker Module's location shall be programmed in software to belong to any combination of software zones. IP Speaker Modules shall be designed to mount near ceiling and wall speakers and in the plenum space.
e. Intercom and paging volume adjustable from Software interface.

3. IP Addressable Zone Paging Module
   a. Zone Paging Module shall connect multiple speakers for district all page, all page, zone paging, bells, audio events and, emergency notification.
   b. Zone Paging Modules shall be rack and wall mountable.
   c. Zone Paging Modules shall be able to belong to one or more of 100 independent zones for live paging, bells, pre-recorded audio and emergency notification.
4. IP Addressable Aux I/O Module
   a. Aux I/O Module shall have two input contacts and two output contacts.
   b. Input and output contacts are individually addressable.
   c. Aux I/O Module shall be wall and rack mountable.
   d. User can program relays to be activated manually, through an event/bell schedule, or during emergency notification.
   e. Aux I/O Module can perform school lockdown from a single press of a panic button.
5. IP Addressable Program Line Input Module
   a. Program Line Input Module shall provide line level audio program distribution into system.
   b. Program Line Input Module shall have a 3.5mm cable jack.
   c. Program Line Input Module shall be configured via web-based user interface.
   d. User can configure program distribution to be activated manually or automatically through an event/bell schedule.
   e. Program Line Input Module will have a system priority level such that emergency communications override program distribution.

D. IP Addressable Analog Gateway
1. IP Addressable Gateway provides integration with existing analog wiring infrastructure – consisting of shielded two-pair classroom field wiring. The Gateway provides the ability to reuse speaker wiring, speakers, and punch blocks to integrate analog infrastructure with IP platform.
   a. Contractor shall only use bridge clips to make junctions at punch down blocks.
2. Each Gateway will have 5 watts of power per port and 25 watts total per device.
3. Supports 24 classrooms that utilize 25 Volt speakers and all current Telecenter call switches for front office notification.
4. Supports minimum of 5 call switch priorities per classroom, capable of lockdown check-in functionality, while reusing existing shielded two-pair classroom field wiring.
5. Classroom intercom volume adjustable from Software interface.
6. Classroom paging volume adjustable from Software interface.
7. Configured to the school network and can be used in conjunction with IP Addressable Modules.

E. IP Addressable Administrative Console
    1. NOT NEEDED

F. Audio Paging/Program Amplifiers – Ashly NE 8250
    1. Power amplifier(s) shall be provided to provide a minimum of 2 watts of power to all paging speakers, and 15 watts of power to all paging horns.
    2. The maximum load on the paging/program amplifiers shall be 80% of the rated maximum output of the amplifiers.

G. Normal/Emergency Call Switch – Rauland Dual Level Call In Switch
    1. Normal/Emergency Call Switches indicated on the drawings shall provide the following functions and features:
        a. One (1) “Normal” call switch that shall activate a distinctive “NORMAL” level call from single button activation. The button shall be clearly marked “NORMAL” and will route the call-in to any one or more Administrative Consoles and/or Marquee Displays for quick and easy response from an Administrative Console.
        b. One (1) “Emergency” call switch that shall activate a distinctive “EMERGENCY” level call from single button activation. The button shall be red in color and shall be clearly marked “EMERGENCY” and will route the call-in to any one or more Administrative Consoles and/or Displays for quick and easy response from an Administrative Consoles.

H. Emergency/Check-In Call Switch – Rauland Check-In Call In Switch
    1. Emergency/Check-In Call Switched indicated on the drawings shall provide the following functions and features:
        a. One (1) “Emergency” call switch that shall activate a distinctive “EMERGENCY” level call from single button activation. The button shall be red in color and shall be clearly marked “EMERGENCY” and will route the call-in to any one or more Administrative Consoles and/or Displays for quick and easy response from an Administrative Consoles.
        b. One (1) “CHECK-IN” call switch that shall activate a distinctive “CHECK-IN” level call from single button activation. The button shall be blue in color and shall be clearly marked “CHECK-IN” and will route the call-in to any one or more Administrative Consoles. This button will be used for emergency check-ins during school emergencies, notifying the front office of the classroom occupants’ safety during an emergency.

I. Interior Ceiling Speakers
    1. Provide Ceiling Speaker Assembly consisting of 8 Ohm, 8” speaker mounted in a 2 foot by 2 foot, or 2 foot by 1 foot, lay-in baffle, with an integrated back box that covers the full area of the baffle.
    2. The speaker shall be connected by inserting an 8-pin RJ45 terminated CAT 5e or Cat 6 cable.
    3. The speaker shall include provisions to allow attachment of a safety cable if required.

J. Wall Mounted Horns – To be white and cream in color, coordinate with architect.
    1. Provide double re-entrant type horn loudspeakers with integral driver. The horn loudspeaker shall be impervious to weather and vandalism. Horn shall be constructed of heavy-duty ABS plastic. Horn loudspeaker drivers shall be rated at 15 watts with a frequency response of 480 Hz to 14 KHz. Sensitivity shall be 106 dB 1 watt, 1 meter. Transformer assembly shall be dual voltage multi-tap type suitable for 25 or 70-volt installations. Dispersion pattern shall be 180 degrees conical. The horn loudspeaker shall be constructed of treated heavy gauge aluminum, with all exposed parts potted and a sealed

driver. Wiring terminal shall be fully enclosed. The speaker flange and mounting surface shall have a cork-rubber gasket. The horn loudspeakers finish shall be gray baked on enamel.

2. The recessed back box shall be of heavy gauge cold-rolled steel, spot welded for stability with a rust-retardant gray primer finish. Acoustically treat the interior to eliminate mechanical resonance. The back box shall be 10-3/4”x10-3/4”x6” deep.
3. The baffle shall be vandal proof, the faceplate constructed of 14-gauge carbon steel with a minimum tensile strength of 55,000 PSI. A lattice grid sub-plate shall deny access to the horn but be acoustically transparent for sound projection. Provide tamper proof, stainless steel mounting hardware. The baffle shall a mar/scratch baked epoxy rust inhibitive finish.

K. Uninterruptible Power Supplies (UPS)
1. UPS equipment provided for this system will include Power Conditioning to smooth current and voltage fluctuations.
2. UPS equipment will be sized in accordance with the system manufacturer’s recommendations.
3. Provide an individual UPS for EACH SYSTEM CONTROLLER (Gateway) furnished with the system.
4. Provide additional UPS(s) for protection of all other equipment furnished with the system and housed in the equipment racks.
5. All UPS equipment shall be rack mounted.

L. OUTDOOR WEATHERPROOF PAGING / PROGRAM SPEAKERS:
1. Shall be UL listed
2. Flush mounted waterproof type paging speakers for voice and tones with matching transformer.
3. Quantity as shown on plans.
4. Provide Soundolier APF-15T With 193-8-6 and VP161-APF Baffle.
   a. Paint to match conditions. Coordinate with architect for final color

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with the Installer present, for compliance with requirements and other conditions affecting the performance of the School Communications and School Safety Network.

B. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install system in accordance with NFPA 70 and other applicable codes. Install equipment in accordance with manufacturer's written instructions.

B. Furnish and install all material, devices, components, and equipment for a complete operational system.

C. Impedance and Level Matching: Carefully match input and output impedances and signal levels at signal interfaces. Provide matching networks where required.

D. Control Circuit Wiring: Install control circuits in accordance with NFPA 70 and as indicated. Provide number of conductors as recommended by system manufacturer to provide control functions indicated or specified.

E. All housings are to be located as indicated.

F. The contractor shall provide necessary transient protection on the AC power feed, all copper station lines leaving or entering the building, and all central office trunks. All protection shall be as recommended by the equipment supplier and referenced to earth ground.

G. Wiring within Enclosures: Provide adequate length of conductors. Bundle, lace, and train the conductors to terminal points with no excess. Provide and use lacing bars.

H. Provide physical isolation from speaker-microphone, telephone, line-level wiring, and power wiring. Run in separate raceways, or where exposed or in same enclosure, provide 12 inch minimum separation between conductors to speaker-microphones, telephone wiring and adjacent parallel power. Provide physical separation as recommended by equipment manufacturer for other system conductors.

I. Identification of Conductors and Cables: Use color coding of conductors and apply wire and cable marking tape to designate wires and cables so all media are identified in coordination with system wiring diagrams. All intercom data cabling to be white in color.

J. Weatherproofing: Provide weatherproof enclosures for items to be mounted outdoors or exposed to weather.

3.3 GROUNDING

A. Provide equipment grounding connections for Integrated Electronic Communications Network systems as indicated. Tighten connections to comply with tightening torques specified in UL Standard 486A to assure permanent and effective grounds.

B. Ground equipment, conductor, and cable shields to eliminate shock hazard and to minimize to the greatest extent possible, ground loops, common mode returns, noise pickup, cross talk, and other impairments. Provide 5-ohm ground at main equipment location. Measure, record, and report ground resistance.

C. Provide all necessary transient protection on the AC power feed and on all copper station lines leaving or entering the building. Note in system drawings, the type and location of these protection devices as well as all wiring information.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Provide services of a duly factory authorized service representative for this project location to supervise the field assembly and connection of components and the pre-testing, testing, and adjustment of the system.

B. Inspection: Make observations to verify that units and controls are properly labeled and interconnecting wires and terminals are identified. Provide a list of final tap settings of paging speaker line matching transformers.

C. Testing: Rectify deficiencies indicated by tests and completely re-test work affected by such deficiencies at Contractor's expense. Verify by the system test that the total system meets the Specifications and complies with applicable standards.

3.5 FINAL ACCEPTANCE TESTING

A. The Final Acceptance Testing shall be provided to the Owner or the Owners designated representative only. Final acceptance testing to any other trade or service provider for the project will not comply with the requirements of this section.

B. The contractor will provide a Final Acceptance Test record document signed by both the contractor and the Owner or designated Owner's Representative establishing the "In Warranty" date. The warranty period will not commence until the Final Acceptance Test is completed.

C. Be prepared to verify the performance of any portion of the installation by demonstration, listening and viewing test, and instrumented measurements. Make additional adjustments within the scope of work and which are deemed necessary by the Owner because of the acceptance test.

3.6 COMMISSIONING

A. The contractor shall train the Owner's maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventative maintenance of the system. This training will be in accordance with the training as outlined in Section 1.6 of these specifications. In addition to the Training Materials provided, the contractor will also furnish Operators Manuals and Users Guides at the time of this training.

B. Schedule training with Owner through the owners representative, with at least seven days advance notice.

3.7 OCCUPANCY ADJUSTMENTS

A. The contractor shall provide Occupancy Adjustments in accordance with Section 1.6 of these specifications. A response scenario amenable to both the owner and the contractor will be established and followed for the first year of service.

3.8 CLEANING AND PROTECTION

A. Prior to final acceptance, the contractor shall vacuum and clean all system components and protect them from damage and deterioration. All blank spaces in equipment cabinets will be covered with blank panels. Top and side panels, and all cabinet doors will be installed. All general areas within and around all equipment rack/cabinets in the facility will be swept, vacuumed, and cleaned up. No cabinets will be left unlocked and all cabinet keys will be turned over to the owner or designated owner's representative.

END OF SECTION 27 51 00

SECTION 28 00 00 - SECURITY BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes general administrative and procedural requirements for Division 28 and is intended to supplement, not supersede, the requirements specified in Division 1.

B. The requirements described herein include the following:
   1. References
   2. Definitions
   3. System Description
   4. Submittals
   5. Quality Assurance
   6. Product Delivery, Storage, and Handling
   7. Project Management and Coordination Services
   8. Warranty
   9. Maintenance

C. Related Sections:
   1. Consult other Sections, determine the extent and character of related work, and properly coordinate work specified herein with that specified elsewhere to produce a complete and operable installation.
   2. Earthwork: Include trenching, backfilling, boring and soil compaction as required for the installation of underground conduit, in-grade pull boxes, vaults, and bollard foundations. Refer to Division 2.
   3. Concrete Work: Include forming, steel bar reinforcing, cast-in- place concrete, finishing and grouting as required for underground conduit encasement, pedestal foundations, and curbs (also includes saw-cutting of existing slabs and grouting of conduits in saw-cut).
   4. Miscellaneous Metal Work: Include fittings, brackets, backing, supports, rods, welding and pipe as required for support and bracing of raceways, equipment enclosures, cameras, and similar devices. Refer to Division 5.
   5. Moisture Protection and Smoke Barrier Penetrations: Include membrane clamps, sheet metal flashing, counter flashing, caulking and sealant as required for waterproofing of conduit penetrations and sealing penetrations in or through fire walls, floors, ceiling slabs and foundation walls. Tape and make vapor tight penetrations through vapor barriers at slabs on grade. Refer to Division 7.
   6. Locking Hardware: Include interface to electronic hardware and door controllers on security related doors. Refer to Division 8.
   7. Access Panels and Doors: Required in walls, ceilings, and floors to provide access to security devices and equipment.
   8. Painting: Include surface preparation, priming and finish coating as required for security cabinets, exposed conduit, pull and junction boxes, and devices where indicated as field painted in this Division. Refer to Division 9.
   9. Elevators: Include interface to elevator floor and hall call on security related elevators. Refer to Division 14.

1.2 DISD REQUIREMENTS

A. For new construction provide conduits sleeved through the foundation grade beam to allow for the future extension of the fire, security, surveillance video systems. For renovations verify requirements with the District (to avoid unnecessarily disturbing existing foundations.)

B. For renovation projects

1. Confirm existing conditions with existing CAD floor plans, before designing alarm systems.

2. Note in construction documents to patch and paint walls and ceilings where any devices are removed.

C. Dallas ISD Board of Trustees approved Electronic Safety and Security vendor to design, provide, and install Access Controls and Video Surveillance Equipment under the General Contractor. Other vendors must be approved in advance by the Dallas ISD Police Department.

1.3 REFERENCES

A. General
1. Codes, standards, and industry manuals/guidelines listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. Consider such codes and/or standards a part of this Specification as though fully repeated herein.
2. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.
3. Reference to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies shall mean that latest edition of such publications adopted and published prior to submittal of the bid unless otherwise specifically stated.

B. Codes: Perform Work executed under this Section in accordance with applicable requirements of the latest edition of governing codes, rules and regulations including but not limited to the following minimum standards, whether statutory or not:
1. United States Department of Labor (DOL) Regulations (Standards - 29 CFR)
   a. Part 1910 – Occupational Safety and Health Standards
2. National Fire Protection Agency (NFPA)
   a. NFPA 70 – National Electrical Code (NEC)
   b. NFPA 75 – Protection of Information Technology Equipment
3. Uniform Building Code (UBC)
4. Uniform Fire Code (UFC)
5. Uniform Mechanical Code (UMC)
6. National, State, Local and other binding building and fire codes
7. FCC Regulations:
   a. Part 15 – Radio Frequency Devices & Radiation Limits
   b. Part 68 – Connection of Terminal Equipment to the Telephone Network

C. Standards: Perform Work and furnish materials and equipment under Division 28 in accordance with the latest editions of the following standards as applicable:
1. Underwriter's Laboratories (UL): Applicable listing and ratings.
   a. UL 294 – Access Control System Units
   b. UL 1076 – Proprietary Burglar Alarm Units and Systems
   c. UL 2044 – Commercial Closed-Circuit Television Equipment

1.4 DEFINITIONS

A. In addition to those Definitions of Division 1, the following list of terms as used in this specification defined as follows:
1. “Owner”: DISD
2. “Engineer”: MEPCE

3. “Furnish”: To purchase, procure, acquire, and deliver complete with related accessories.
4. “Install”: To set in place, join, unite, fasten, link, attach, set up or otherwise connect together and test before turning over to the Owner, parts, items, or equipment supplied by contractor or others. Complete installation and make ready for regular operation.
5. “Provide”: To furnish, transport, install, erect, connect, test and turn over to the Owner, complete and ready for regular operation.
6. “Connect”: To install required patch cords, equipment cords, cross-connect wire, etc. to complete an electrical or optical circuit.
7. “As directed”: As directed or instructed by the Owner, or their authorized representative.
8. “Cabling”: A combination of cables, wire, cords, and connecting hardware (e.g., cables, conductor terminations, connectors, outlets, patch panels, blocks, and labeling).
9. “SEC”: Security Equipment Cabinet
10. “SJB”: Security Junction Box
11. “ACAMS”: Access Control & Alarm Monitoring System
12. “DCS”: Detention Control System
13. “IDS”: Intrusion Detection System
14. “NVR”: Network Video Recorder
15. “VSS”: Video Surveillance System

1.5 SYSTEM DESCRIPTION

A. In circumstances where the Specifications and Drawings conflict, the Drawings shall govern quantity and the Specifications shall govern quality.

1.6 SUBMITTALS

A. Submit required submittals to the General Contractor in the quantities and formats as required under the general contract. In the absence of requirements, provide as described in the following with reference to quantity and format.

B. Contractor Qualifications
   1. Resumes of the Project Manager, General Foreman, and Lead Technician(s) indicating role, years of experience, product certifications and training, listing of similar projects the individual performed the role proposed for this project along with client contact information for each.
   2. Certification letters stating the Contractor is an authorized reseller, installer, and extended warranty provider for the following systems:
      a. ACAMS manufacturer & certification level
      b. VSS manufacturer & certification level

C. Product Data
   1. Obtain written approval from the Engineer for the product data submittal prior to the release of materials and equipment purchase order and prior to installation.
   2. Quantity: Submit product data submittals as described in Division 1.
   3. Format:
      a. Minimum Format: Submit each product data submittal in an 8-1/2 x 11 inch folder. Product data submittal shall be in a 3-ring binder (or similar). If in a 3-ring binder, insert the submittal information the transparent front cover and spine pockets.
      b. Clearly label the cover and spine of each submittal with the following information:
         1) Client Name
         2) Project Name and Address
         3) Project Submittal Number

4) Submittal Name (e.g., “Product Data Submittal for Video Surveillance System”)
5) Specification Section Number (e.g., “Section 28 2300”)
6) Date of Submittal Format: <month> <day>, <year> (e.g., “January 1, 2020”)
7) Contractor Name

c. Include a Table of Contents at the beginning of the submittal that lists materials by article and paragraph number (e.g., “2.02-A Network Video Recorders”).
d. Include tabbed separators for improved navigation through the submittal.

4. Content:
   a. Cover Letter: Product data submittals shall include a cover letter stating that the submittal is in full compliance with the requirements of the Contract Documents. Sign (and stamped, if applicable) cover letter and list items and data submitted. Have the person who prepared the submittal sign the document as well. Failure to comply with this requirement shall constitute grounds for rejection of submittal.
   b. Product Information: Product Data submittal shall consist of manufacturer's technical data, product literature, "catalog cuts", data sheets, specifications, and block wiring diagrams (if necessary). This data shall clearly describe the product’s characteristics, physical and dimensional information, electrical performance data, materials used in fabrication, material color & finish, and other relevant information such as test data, typical usage examples, independent test agency information, and storage requirements. Clearly indicate by arrows or brackets precisely what is being submitted on and those optional accessories, which are included and those which are excluded. At a minimum, include products listed in the Division 28 specifications. Include relevant products that will be installed, which are not listed in the specifications.
   c. Re-submittals: Provide a cover letter with the re-submittal that lists the action taken and revisions made to each product submittal in response to Submittal Review Comments. No review shall take place for any re-submittal packages that is not accompanied by this cover letter. Failure to include this cover letter will constitute rejection of the re-submittal package.

D. Shop Drawings
   1. Obtain written approval from the Engineer for the shop-drawings submittal prior to the release of materials and equipment purchase order and prior to installation.
   2. Quantity and Media: Submit shop-drawings as described in Division 1.
   3. Format:
      a. Produce shop drawings using AutoCAD, or other computer design application that can save files to AutoCAD-compatible files.
      b. Use the same size drawing sheet as the drawings of the Contract Documents.
      c. Text: minimum of 3/32” high when plotted at full size.
      d. Screen background information.
      e. Plot system components (devices, cable routes, etc.) and text at a sufficient line weight to stand out against background information.
      f. Scaling:
         1) Scale floor plans at 1/8”=1’-0”
         2) Scale enlarged room plans at 1/4”=1’-0”
         3) Scale wall elevations at 1”=1’-0”
   4. Content:
      a. Submit shop drawings that represent proposed installation of security system.
      b. Floor Plans: Scale floor plans at 1/8”=1’-0”. Floor plans shall show:
         1) Locations and identifiers of security devices.
         2) Size, quantity, location and proposed routes of security cabling.
         3) Size, quantity, location, and routes of pathways (such as cable trays, cable basket, conduits, cable hangers, and other cable support devices).

c. Point-to-Point Diagrams: Include wiring, points of connection and interconnecting devices.
d. Schedules: Provide schedules for devices and control panels that show each point ID with a description of the connected devices.
e. Block Diagram/Riser Diagram: Show the devices, conduit, wire types, and sizes between them, including cabling interties between termination hardware.
f. Proposed mounting details

E. As-Built Drawings
1. Quantity and Media: Submit as-built drawings as described in Division 1.
2. Format:
a. Produce as-built drawings using AutoCAD, or other computer design application that can save files to AutoCAD-compatible files.
b. Use the sheet size as the drawings of the Contract Documents, and use the project title block.
c. Text: minimum of 3/32" high when plotted at full size.
d. Use symbols identical to the symbols shown on the Drawings.
e. Screen background information.
f. Plot system components (devices, cable routes, etc.) and text at a sufficient line weight to stand out against background information.
3. Content:
a. Submit as-built drawings that fully represent actual installed conditions and that incorporate modifications made during the course of construction.
b. Floor Plans: Scale floor plans at 1/8"=1'-0". Floor plans shall show:
1) Locations and identifiers of security devices.
2) Size, quantity, location and proposed routes of security cabling.
3) Size, quantity, location, and routes of pathways (such as cable trays, cable basket, conduits, cable hangers, and other cable support devices).
c. Point-to-Point Diagrams: Include wiring, points of connection and interconnecting devices.
d. Schedules: Provide schedules for devices and control panels that show each point ID with a description of the connected devices.
e. Block Diagram/Riser Diagram: Show the devices, conduit, wire types, and sizes between them, including cabling interties between termination hardware.
f. Custom mounting details

F. Operation and Maintenance (O&M) Manuals
1. Quantity: Submit quantity of O&M Manuals as described in Division 1.
2. Format:
a. Submit each O & M Manual in a white, 3-ring binder with front cover and spine clear pockets for insertion of the project information.
b. Clearly label the cover of each O&M Manual with the following information:
1) Client Name
2) Project Name and Address
3) Manual Name (e.g., "Operation and Maintenance Manual for Video Surveillance System")
4) Date of Submittal Format: <month> <day>, <year> (e.g., "January 1, 2020")
5) Contractor Name
c. Include a Table of Contents at the beginning that lists the contents.
d. Include tabbed separators for improved navigation through the manual.
3. Content:
a. 11"x17" prints of as-built drawings, as described above
b. Manufacturer's original catalog information sheets for each component provided under applicable Section (typically, this is similar to the accepted product data submittal)
c. Warranty certificate from the manufacturer and the Contractor
d. Manufacturer's instructions for system or component use

e. Instructions and requirements for maintenance and warranty issues
4. Contents shall include requirements and methods for maintaining installed products.

1.7 QUALITY ASSURANCE

A. Contractor Qualifications
1. A current, active, and valid and Texas State Contractors License
2. Minimum five years experience in installation and service of access control, video surveillance, and intrusion detection systems.
3. Minimum five completed projects similar to scope and cost.
4. Evidence of technicians qualified for the work in the form of current manufacturer's training certification

B. Materials
1. Materials, support hardware, equipment, parts comprising units, etc., shall be new, unused, without defects and of current manufacturer, materials
2. Use specified products and applications, unless otherwise submitted and approved in writing.

C. Regulatory Requirements
1. Work and materials shall conform to the latest rules of National Board of Fire Underwriters wherever such standards have been established and shall conform to the regulations of the State Fire Marshal, OSHA and the codes of the governing local municipalities. Work under Division 28 shall confirm to the most stringent of the applicable codes.
2. Provide the quality identified within these Specifications and Drawings when codes, standards, regulations, etc. allow Work of lesser quality or extent. The Contract Documents address the minimum requirements for construction.

D. Drawings
1. Follow the general layout shown on the Drawings except where other Work may conflict with the Drawings.
2. Drawings for the Work within this Division are essentially diagrammatic within the constraints of the symbology applied.
3. The Drawings do not fully represent the entire installation for the security system. Drawings indicate the general route for the cables and the location of outlets. The Drawings might not expressly show every conduit, sleeve, hanger, etc., but a complete system is required.

1.8 PROJECT MANAGEMENT AND COORDINATION SERVICES

A. Project Management and Coordination Services
1. Provide a project manager for the duration of the project to coordinate this Work with other trades. Coordination services, procedures and documentation responsibility include, but are not limited to, the items listed in this section.
2. Review of Shop Drawings Prepared by Other Subcontractors:
a. Obtain copies of shop drawings for equipment provided by others that require telecommunication service connections or interface with Work.
b. Perform a thorough review of the shop drawings to confirm compliance with the service requirements contained in the Division 28 contract documents. Document discrepancies or deviations as follows:
1) Prepare memo summarizing the discrepancy
2) Submit a copy of the specific shop drawing, indicating via cloud, the discrepancy
c. Prepare and maintain a shop drawing review log indicating the following information:
1) Shop drawing number and brief description of the system/material
2) Date of the review

3) Name of the individual performing the review
4) Indication if follow-up coordination is required

B. Role of the Engineer
1. During the construction phase of the project, the Engineer will work with the Contractor to provide interpretation and clarification of project contract documents, reply to (and 'process') relevant Requests for Information (RFIs), and act as an interface between the Contractor and the Owner.
2. The Owner has retained the Engineer's services to observe the Work for general compliance with the Contract Documents and to ensure that the installation meets the design intent of the system.
3. In general, the Engineer will participate during the construction phase as follows:
   a. Review product data and shop drawings submittals for general compliance with the contract drawings and specifications.
   b. Review changes as they arise, and confirm that the proposed solutions maintain the intended functionality of the system.
   c. Interpret field problems for Owner, and translate between Owner and Construction Team.
   d. Review the testing procedures to confirm compliance with industry-accepted practices.

C. Use of CAD Files
1. Should the Contractor need the Engineer's CAD files to produce shop drawings and/or as-built drawings, the Engineer requires the Contractor sign a CAD files release agreement.

1.9 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery
1. Do not deliver security system components to the site until protected storage space is available. Storage outdoors covered by rainproof material is not acceptable.
2. Replace equipment damaged during shipping and return to manufacturer at no cost to the Owner.

B. Storage
1. Store materials in a clean, dry, ventilated space free from temperature extremes.
2. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect units from dirt, water, construction debris, and traffic.
3. Provide heat where required to prevent condensation or temperature related damage.

C. Handling
1. Handle in accordance with manufacturer's written instructions.
2. Prevent internal component damage, breakage, denting and scoring. Do not install damaged equipment. Replace damaged equipment and return equipment to manufacturer.

1.10 WARRANTY

A. Provide the Security System as described in this specification with a one-year parts and service warranty at no additional cost to the Owner.

B. Include in the warranty package, at a minimum, the following:
1. Software support agreement for the ACAMS and VSS
2. Software upgrades and patches
3. Labor to install software upgrades and patches necessary to maintain the latest version
4. Emergency service on regular working hour basis

5. Service by factory trained and employed service representatives of system manufacturer

C. Maintain regular service facilities and provide a qualified technician familiar with this work at the site within four (4) hours of receipt of a notice of malfunction including weekends and holidays. Provide material, devices equipment and personnel necessary for repairs. Install approved temporary, alternate equipment if required by the Owner, complete and operational within twenty four (24) hours after notification of a malfunction, at no additional cost.

D. Conduct warranty repairs and service at the job site unless in violation of manufacturer's warranty; in the latter event, provide substitute systems, equipment and/or devices, acceptable to the Owner, for the duration of such off-site repairs. Transport warranty substitute and/or test systems, equipment, devices, material, parts and personnel to and from the job site at no additional cost.

1.11 MAINTENANCE

A. Extra Materials
   1. Deliver extra materials to a secured location determined by the Owner.
   2. Provide a complete Bill of Materials listing quantities, part numbers, and descriptions for each device for the Owner to sign indicating receipt of equipment.
   3. Provide new and unused spare parts in their original packing materials upon delivery.

B. Maintenance Service
   1. For the first year of service, conduct quarterly system performance review meetings to review system operation problems and/or defects that occurred during the preceding 3 months. During these performance review meetings, perform the following:
      a. Visual checks and operational tests of the central processor, local processors, monitors, keyboards, system printers, peripheral equipment, ACAMS equipment, power supplies, and electrical and mechanical controls
      b. Clean system equipment, including interior and exterior surfaces
      c. Perform diagnostics on equipment
      d. Check and calibrate each device
      e. Run system software and correct diagnosed problems
      f. Resolve previous outstanding problems
   2. Provide software and firmware updates issued free of charge by the manufacturer.

PART 2 - PRODUCTS

2.1 GENERAL

A. Material and equipment specified herein have been selected as the basis of acceptable quality and performance and have been coordinated to function as components of the included systems. Where a particular material, device, equipment or system is specified directly, the current manufacturer's specification for same is a part of these specifications, as if completely elaborated herein.

B. Use standard, regularly manufactured, materials and equipment for this and/or other similar systems, and not custom designed especially for this project. Provide systems and components thoroughly tested and proven in actual use. Provide subsystems of one manufacturer.

2.2 SUBSTITUTIONS

A. Conform to the general requirements and procedure outlined in Division 1 in the Request for Substitution.

B. Only one substitution allowed for each product specified.

C. Where products are noted as "or equal", a product of equivalent design, construction, and performance will be considered. Submit product data – catalog cuts, product information, and pertinent test data –required to substantiate that the product is in fact equivalent to that specified. The burden of proof rest with the Contractor that the substituted product is equivalent to the specified product.

D. Manufacturers' names and model numbers used in conjunction with materials, processes or equipment included in the Contract Documents are used to establish standards of quality, utility and appearance. Materials, processes or equipment that, in the opinion of the Engineer, are equivalent in quality, utility and appearance will be approved as substitutions to that specified when “or equal” follows the manufacturers' names or model number(s).

E. When the Engineer accepts a substitution in writing, it is with the understanding that the Contractor guarantees the substituted product, component, article, or material to be equivalent to the one specified and dimensioned to fit within the construction according to contract documents. Do not provide substituted material, processes, or equipment without written authorization from the Engineer. Assumptions on the acceptability of a proposed substitution, prior to acceptance by the Engineer, are at the sole risk of the Contractor.

F. Approved substitutions shall not relieve the Contractor of responsibilities for the proper execution of the Work, or from provisions of the Specifications.

G. Pay expenses, without additional charge to the Owner, in connection with substitution materials, processes and equipment, including the effect of substitution on self, subcontractor's or other Contractor's work.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Conditions: Verify existing conditions, which have been previously provided under other sections, are acceptable for product installation in accordance with manufacturer's instructions.

B. Pathways: Verify that pathways and supporting devices, which have been previously provided under other sections, are properly installed, and that temporary supports and devices have been removed.

C. Field Measurements: Verify dimensions of pathways, including length of pathways. For example, “True Tape” the conduits to verify cable distances.

3.2 FIELD QUALITY CONTROL

A. Staffing: Provide a qualified foreman who is in charge of the Work and who is present at the job site at times Work is being performed. Perform the Work using skilled technicians under the direction of the foreman. Supervise the work force executing the Work. Perform the installation within the restraints of the construction schedule. Do not change the supervisor during the project without prior written approval from the Owner.

B. Inspection: Perform inspection after installation. Keep areas of work accessible and notify code authorities, or designated inspectors, of work completion released for inspection. Document completion and inspection as required.

3.3 INSTALLATION

A. Perform this work in accordance with acknowledged industry and professional standards and practices and the procedures specified herein.

B. Provide a complete, operating system. Include devices specified including basic components and accessories, interconnecting wiring and other equipment and installation devices necessary for a complete system as specified.

C. Manufacturer's Instructions:
   1. Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, and product carton instructions for installation.
   2. Maintain jobsite file of Material Safety Data Sheets (MSDS) for each product delivered to jobsite.

D. Boxes, Panels, and Enclosures
   1. Install boxes, panels, and enclosures square and plumb.
   2. Set "flush mounted" units with the face of the cover, bezel or escutcheon in the same plane as the surrounding finished surface.
   3. Mount boxes, panels and trim so that there are no gaps, cracks or obvious lines between the trim and the adjacent finished surface and ready them to receive final finish, as applicable.
   4. Install insulating terminations in signal circuit boxes, panels, wireways or enclosures.

E. Painting
   1. Custom paint devices as indicated on the drawings.

3.4 REPAIR/RESTORATION

A. Replace or repair work completed by others that you deface or destroy, at not cost to the Owner.

B. Punch List:
   1. Inspect installed work in conjunction with the General Contractor and develop a punch list for items needing correction.
   2. Provide punch list to Engineer for review prior to performing punch walk with the Engineer.

C. Re-Installation:
   1. Make changes to the system such that defects in workmanship are correct and cables and the associated termination hardware passes the minimum test requirements.
   2. Repair defects prior to system acceptance.

D. Painting: Repaint surfaces altered during installation of the security system to match previous conditions.

3.5 CLEANING

A. Remove temporary coverings and protection of adjacent work areas. Remove unused products, debris, spills, or other excess materials. Remove installation equipment.

B. Leave finished work and adjacent surfaces in neat, clean condition with no evidence of damage.

C. Repair or replace damaged installed products.

D. Legally dispose of debris.

E. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance.

END OF SECTION 28 00 00

SECTION 28 16 00 - INTRUSION DETECTION SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. General: Furnish engineering, labor, materials, apparatus, tools, equipment, transportation, temporary construction, and special or occasional services required to make a complete working intrusion detection system installation as described in these specifications.

B. Section includes:
   1. Intrusion Detection System, including digital communicator, keypad, and alarm devices.
   2. Door contacts, glass break detectors, motion sensors
   3. Duress alarm stations
   4. Interfaces and connections between intrusion detection subsystems to allow communication with one another

C. Products furnished and installed under another section:
   1. 120V power
   2. Phone line

D. Related sections:
   1. Section 28 00 00 – Basic Security Requirements: for submittal format, warranty, general product requirements, and installation requirements

1.2 SYSTEM DESCRIPTION

A. Overview
   1. The IDS is utilized for monitoring AES-Multinet receiver at Dallas ISD's central monitoring system.
   2. Activation of the IDS direct dials a receiver located in the Security room for dispatch of the main reception office.

B. Interface with Existing System
   1. Provide connectivity with existing facility IDS. Remote monitoring and controls shall be coordinated with facility security.

1.3 SUBMITTALS

A. Product Data: Submit product information for the intrusion detection systems, including:
   1. IDS control panel
   2. Keypads
   3. Calculations for backup batteries
   4. Provide specification compliance

B. Shop Drawings: Submit shop drawings containing the following:
   1. Device placement on floor plans
   2. Point-to-Point Wiring Diagrams: Include wiring, points of connect, and interconnecting devices between the following:
      a. IDS control panel
      b. IDS expansion modules and relays
      c. Keypads

d. Motion sensors
e. Alarm contacts
f. Power supplies
g. Cable conductors (identify conductors on the point-to-point diagrams with the same tag as the installed conductor)

3. Schedules: Provide schedules for the IDS control panel that show each alarm zone, applicable area or partition, and a description of the connected device.
4. Custom mounting details

1.4 DISD REQUIREMENTS

A. Security Systems are provided at all Elementary, Middle, and High Schools.

B. Provide a motion detector facing each exterior door.

C. Provide narrow beam, long-range, ceiling-mounted detectors in corridors on each floor, mounted halfway down the corridor, back-to-back, facing opposite directions. Verify range with manufacturer's specifications.

D. Provide 360-degree motion detectors in first floor perimeter classrooms with windows or door access, gymnasiums, and classrooms on other floors if there is roof access through doors or windows.

E. Provide motion detectors in all high-security areas, such as computer labs, libraries/media centers, and administration areas, and in all spaces with exterior doors.

F. Provide motion detectors in stairwells.

G. Provide beam detection devices on roofs with HVAC equipment.
1. Mount exterior beam detectors taking aesthetic concerns into account.
2. Detection devices, or conduits, may not penetrate roof membrane or flashing.

H. Do not use door contacts.

I. Do not use window contacts or glass-break detectors.

J. The wiring for each of the motion detectors must be a home run back to the security panel for the facility or to the expansion module.

K. Expansion modules may be located in offices or closets throughout the building for ease of installation. All expansion modules must be tied into the main security panel. Provide external power supply with each expansion module. Locate module and power supply inside enclosure and install near electrical outlet.

L. Provide security system keypads at locations designated by Dallas ISD Police. Typical

M. Locations include, but not be limited to; the front main entrance door, in the administration area, and back door, in the receiving area.

N. For secondary schools, also provide key pads for special use areas such as gymnasiums, ROTC rooms, band halls, etc.

O. For addition projects, connect the new devices to the existing system. In the event that there is not adequate capacity, then the existing panel must be increased in capacity or replaced. If replacement of the existing system is required by codes, then existing security devices and wiring etc. should also be replaced.

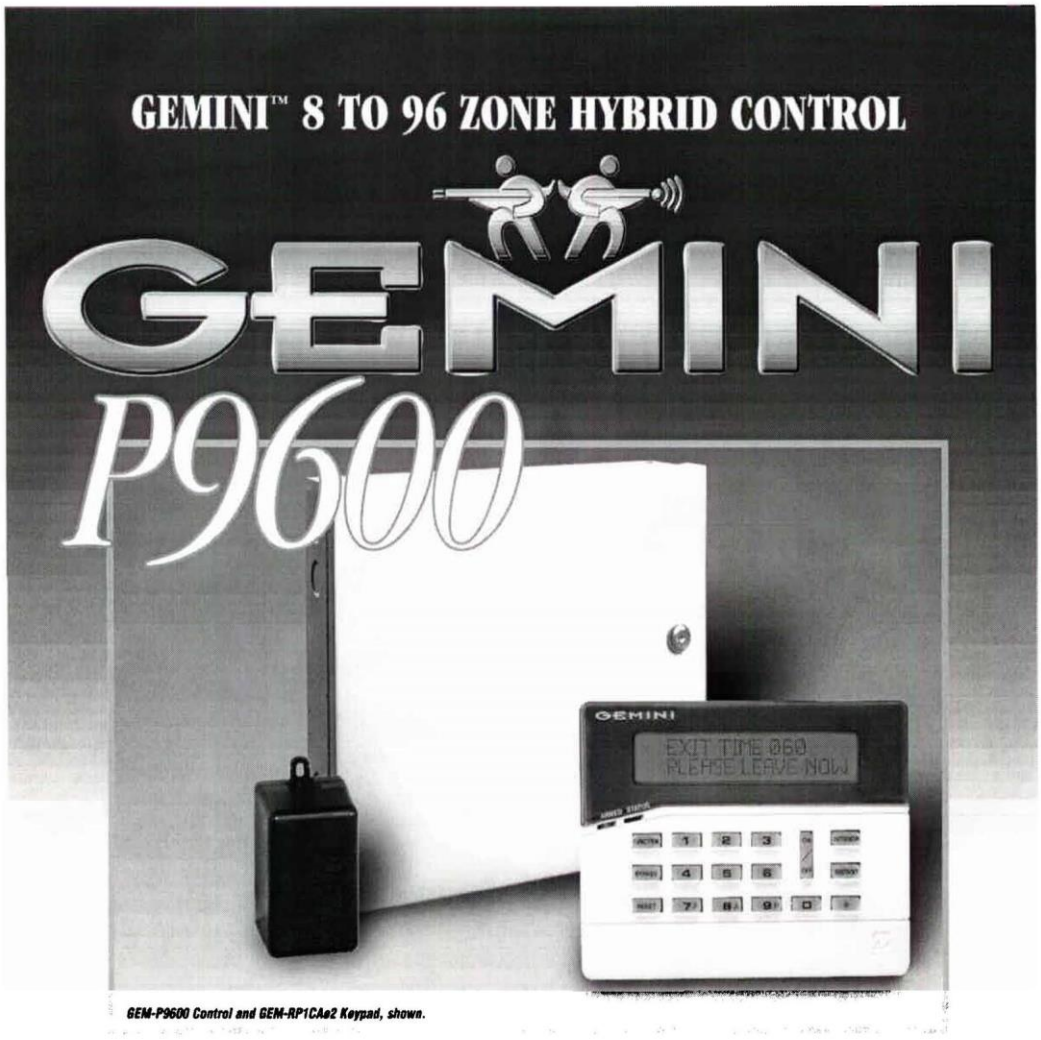
P. For renovation projects:
   1. With electronic safety and security in the scope:
      a. Existing security devices and wiring should be removed and new security devices and wiring installed.
      b. Do not re-use existing components orwiring.
   2. Without electronic safety and security in the scope:

Q. Reinstall all devices and test system at the conclusion of the project.

PART 2 - PRODUCTS

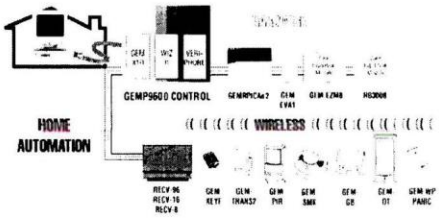
2.1 IDS CONTROL PANELS

A. General
   1. Integrated UL listed digital communicator with phone line monitor (loop or ground start).
   2. Supports up to75 alarm zones and 8 programmable areas or partitions.
   3. Capable of utilizing multiple telephone numbers, primary and duplicate paths with main and alternate destinations.
   4. Capable of utilizing a dual phone line switcher to monitor 2 phone lines.
   5. Capable of sending daily automatic test and status reports.
   6. Supports supervised expansion and relay output modules.
   7. Supports RS-232 connectivity to third party devices for automation.
   8. Capable of utilizing an TCP/IP converter for Ethernet connectivity.



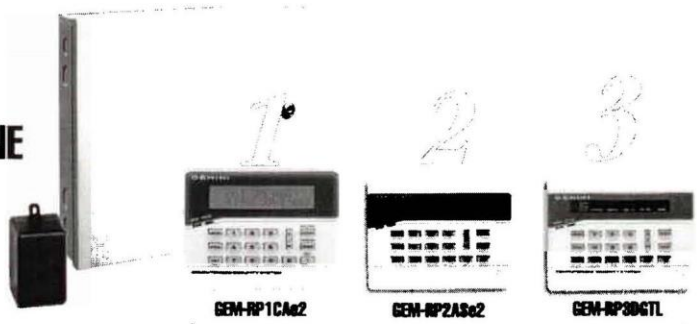
GEM-P9600 Control and GEM-RP1CAe2 Keypad, shown.

NAPCO's Gemini™ GEM-P9600 is a powerful multi-tasking hybrid control panel. It is feature-rich for both security applications and seamless home automation integration.



GEMINI™
BY NAPCO
The Power of Innovation

GEMINI™ 8 TO 96 ZONE HYBRID CONTROL



GEM-RP1CAe2 | GEM-RP2ASe2 | GEM-RP3DGTL

CHOICE OF THREE KEYPAD STYLES

CONTROL PANEL FEATURES

Exit/Entry Delay, Interior, Follower, Day Zone, Chime, Fire Option, Sensor Watch, Swinger Shutdown, Zone Arming and a variety of other features

- Up to 96 zones with optional zone-expension modules and 4-zone keypads
- Including up to 8 2-Wire Fire Zones
- Up to 96 individually coded users, each with a programmable authority level
- **Exclusive RS232 Panel-Port supports PC Home Automation/ Networking Integration for 9600 Baud comprehensive communications**
- 3 on-board relay outputs, expandible to 96
- Three keypad panics: Fire, Police & Auxiliary
- Up to 8 independent area partitions
- Up to 8 separate access stations by up to 96 users
- Up to 64 separately-addressable X-10 devices with the GEM-KXIONI
- English-language prompts & system status messages from choice of Keypad (3) models
- User-customized zone descriptions, reprogrammable as required
- Supports 2-wire and 4-wire smoke detectors
- Reports alarms, restores and troubles by zone
- 255 Event Schedule
- 800 Event Log
- Overview Mode permits monitoring and control of total system from one keypad
- Supports up to 4 RF Receivers
- Guard-Tour programmable for start time, tour length and check points (tour stations)
- 2 programmable entry delay times
- 2 interior -bypass groups
- Dynamic battery test interrupts charging and places battery under load every four hours
- Chime by zone, programmable duration
- Non-volatile RAM retains memory during power losses
- Quickloader™ programmable
- Auto-Download Log
- Exclusive VALID.™ FEATURE (Verifying Automatic Line Integrity Diagnostic) reduces false alarms due to changes in line resistance

COMMUNICATOR FEATURES

- Compatible with all major receiver formats, including: BFSK, 4/2, Modem 2, SIA, 4/3/1, 4 + 2 Express and Point ID
- Rotary dial and TouchTone™ with Rotary backup
- 3 20-digit telephone numbers
- Backup reporting, Double Reporting, Split Reporting
- 96 User Codes with Opening/Closing Reporting by User
- AC Failure Reporting with programmable report delay
- Supervised telephone line cut with programmable delay
- Pager capability

SPECIFICATIONS

- Operating Temperature: 0-49°C (32-120°F)
- Input Power: 16.5Vac via Class 2 Plug-in 40VA Transformer, supplied
- Loop Voltage: 10-13VAC
- Loop Current:2.5mA with 2.2ohm end-of-line resistor (model EOL2.2K); 5mA for 2-wire smoke-detector zones
- Loop Resistance: 300W max; 50W for 2-wire smoke detector zones
- Relay Outputs (Burglary, Reset, Aux): Wet, 12Vdc, 1.2A max; Dry (cut related jumper for dry contacts), SPDT contacts, 24Vdc, 2A, 0.6 PF
- Auxiliary Power Output: 12 Vdc regulated
- Remote Power Output: 12Vdc regulated (for keypads)
- 750 mA combined Standby Current (Remote Power + Aux Power + Reset Relay Power)
- Standby Time: Residential Fire/Burglary & Commercial Burglary: 4 hours minimum
- EZM Module
  GEM-EZM8: Input, 50mA (including PGM Output) PGM Output: 5MA, 12V Special Application
- Keypad Current:
  GEM-RP1CAe2: 100mA; 35mA if back lighting is disabled (cut W1, W2 & W3) PGM Output: 5mA, 12V Special Application
- Maximum Number of Keypads: 15 Maximum Wiring Length for each run (#22AWG): 1000' divided by total number of keypads & EZMs on run
- Designer Keypad Dimensions: 4 3/8" x 5 7/8" x 1 1/6" (HWD); 11.1cm x 14.9cm x 2.7cm (HWD)

ORDERING INFORMATION

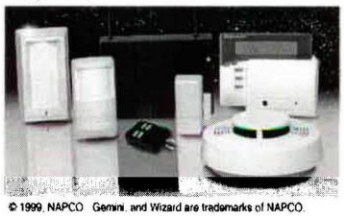
- GEM-P9600: Hybrid Control Panel
- GEM-P9600M: Mercantile Version of Above
- GEM-RP1CAe2: 32-Character EZ-Read Backlit LCD Keypad with 4 EOL Zone Expansion Module built-in
- GEM-RP2ASe2: Alpha/Icon Keypad
- GEM-RP3DGTL: Digital Keypad

OPTIONAL ACCESSORIES AND PERIPHERALS

- GEM-EZM8: 8-Zone Expansion Zone Module
- GEM-EVA: Electronic Voice Annunciator - Unique Consumer Aid "Talks" users through system operation
- VERI-PHONE: Two-Way Voice/Listen-In Module
- WIZARD II: Re-Talking Alarm/Appliance Remote Controller works through any touch-tone phone
- GEM-RECV8: Wireless Receiver, 8 Points
- GEM-RECV16: Wireless Receiver, 16 Points
- GEM-RECV96: Wireless Receiver, 96 Points
- GEM-TRANS2: Window/Door Transmitter, 2-Point
- GEM-KEYF: Key Fob Transmitter
- GEM-SMK: Wireless Smoke Detector
- GEM-PIR: Wireless PIR, 50x50'
- GEM-DT: Wireless Adaptive® Dual Technology Sensor, 40x40'
- GEM-GB: Wireless Glass Break Detector
- GEM-WPPANIC: Waterproof Panic Button/Pendant

HOME/FACILITIES AUTOMATION:

- **GEM-AUTOMATION: Alarm-to-PC Interface for 100% 2-Way Intercommunications with a growing number of Leading PC Automation Software Packages (including, but not limited to, IBM Home Director™, Savoy Cyberhouse™, Crestron, Phast, etc.)**
- **GEM-DEVELOPER System Development Professional's Protocol for Custom Programming & Seamless Integration with Gemini RS232 Port Communications.**
- **GEM-RS232 Permanent RS232 Panel-Port Interface**
- **GEM-X10 Interface Module Provides Programming & Scheduler-Integrated X-10 Device Support.**
- RM3008: Relay Module
- M4278: Line-Reversal Module
- PS3002: Power-Supply Module, 13.2Vdc, 1.9A
- EOL130: 2-Wire Fire Zone Resistor, 130ohm, 3ohm
- EOL2.2K: End-of-Line Resistor Assembly, 2.2ohm for Fire Circuit
- FT2200: End-of-Line Relay/Resistor Supervisory Module
- RB1000: Relay Board
- RBAT4: Rechargeable Battery, 12Vdc, 4AH
- RBATH1: Dual Battery Harness
- RPB-3: Universal Junction Box
- TRF11: Transformer, 16Vac/40VA, Class 2
- WL1: Wire Assembly with Lug Connector
- PCD3000: Downloading Software for IBM PC-Compatible
- PC12000/30000: Quickloader Up/Downloading Software
- PCI-MINI: Notebook Computer Interface
- OI163: Instruction Manual GEM-P9600
- WI777: Programming Manual



Supports GEM-WP PANIC Waterproof Panic Button/Pendant

(L-R) GEM-DT RF Adaptive Dual, GEM-PIR RF PIR, GEM-KEYF Wireless Key, GEM-RECV8/16 RF Receivers, GEM-TRANS2 RF Window/Door Transmitter, GEM-SMK Wireless Smoke and GEM-GB RF Glass Break.

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A400A

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Installation Instructions
DS918i/DS928i
Passive Infrared Intrusion Detectors

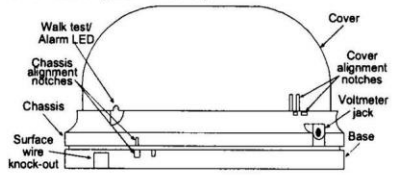
The DS918i and DS928i are ceiling/wall mount passive infrared intrusion detectors designed to provide an alarm signal upon the detection of an intruder moving into or through their respective coverage patterns.

1.0 General Information

- **Input Power:** 9.0 to 28.0 VDC.
- **Current Draw:** 20.0 mA maximum when in alarm condition.
- **Standby:** Intended for connection to DC power supplies capable of supplying power if primary power fails. Four hours (80 mA-h) minimum are required for UL Certificated installations.
- **Coverage:**

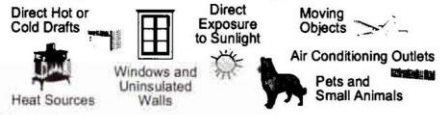
DS918i	DS928i
Wide coverage	Long coverage
15 zone pairs	8 zone pairs
30 fingers	16 fingers
4 arrays	8 arrays
83° total spread	100 ft. max. range
45 ft. max. range	

- **Alarm Contacts:** Form B (NC,C) dry contacts, rated 0.2 amps max. @ 30 VDC.
- **Tamper Switch:** Form B (NC,C) cover activated tamper switch, rated 1.0 amp @ 30 VAC/VDC.
- **Sensitivity Selection:** Field selectable (918i only) for Standard (6 pulse counts), Intermediate (4 pulse counts), or High (2 pulse counts) sensitivity. The DS928i is set at High sensitivity when shipped.
- **Pointability:** The optical module has a total range of 115° vertical and ± 30° horizontal.
- **Temperature:** The storage and operating temperature range is from -4° to 122°F (-20° to 50°C).



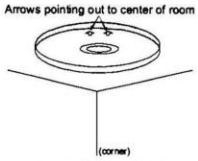
2.0 Installation Considerations

Common things to avoid when installing the DS918i or DS928i:



3.0 Mounting

- Select a location likely to intercept an intruder moving across the coverage pattern. Make sure the surface is solid and vibration free.
- Remove the detector's base. Hold the detector with the cover facing you, then twist the base clockwise.
- If surface wiring, remove both surface wire knock-outs from the base.



3.1 Ceiling Mount

- Position the base with the embossed arrows pointing in the direction of the desired coverage.
- Mount the base to the ceiling using the 4 long, curved mounting slots.

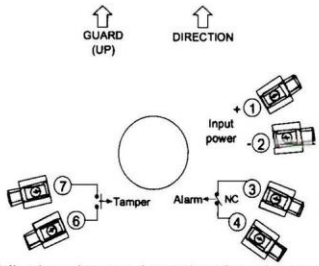
3.2 Wall Mount

- Position the base with the embossed arrows pointing straight up at the ceiling.
- Mount the base to the wall using any of the mounting slots.

4.0 Wiring

CAUTION: ONLY APPLY POWER AFTER ALL CONNECTIONS HAVE BEEN MADE AND INSPECTED.

- Wire to the base as depicted below.

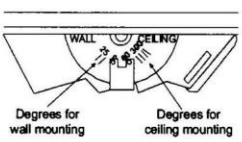


- Use the following chart to determine the minimum gauge wire needed per length of wire run between the power source and the last unit on the run.The chart is based on one detector connected to a wire run from the power source. If more than one detector is added to the run, the maximum length per gauge decreases and is determined by dividing the length found in the chart by the number of detectors on the run. The chart is based on the use of a 12 VDC power source.

Wire Size	Max. Distance
22 AWG (0.8 mm)	2,330 ft. (710 m)
20 AWG (1.0 mm)	4,000 ft. (1,219 m)
18 AWG (1.2 mm)	6,330 ft. (1,929 m)

5.0 Initial Aiming and Set-Up

- Remove the detector's cover. Hold the detector with the cover facing you, pinch the cover alignment notches inward and rotate the cover counter-clockwise; lift off.
- Rotate the optical module to desired angle. Use the chart to determine this angle.



DS918i Desired Range	Angle	DS928i Desired Range	Angle
13 ft. (4 m)	24°	16 ft. (4.9 m)	19°
20 ft. (6.1 m)	16°	33 ft. (10 m)	10°
26 ft. (7.9 m)	12°	49 ft. (14.9 m)	7°
33 ft. (10 m)	10°	66 ft. (20.1 m)	5°
39 ft. (11.9 m)	8°	82 ft. (25 m)	4°
46 ft. (14 m)	7°	98 ft. (29.9 m)	3°

NOTE: The above chart is based on a mounting height of 8.3 ft. (2.5 m) from the floor.

- Select sensitivity setting (DS918i only. The DS928i has been programmed to two pulse counts before an alarm is signaled.).

  Standard (6 pulse counts): Tolerates environmental extremes at this setting.

  Intermediate (4 pulse counts): The recommended setting for locations where an intruder is expected to cover only a small portion of the protection area. Tolerates normal environments at this setting.

  High (2 pulse counts): Fast response to intruder signals. For use in quiet environments where thermal and illumination transients are not anticipated.

detection systems

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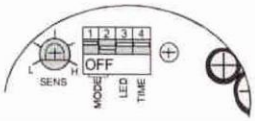
See the diagram below for a depiction of the sensitivity switches.



Pulse Count	Switch	Description
2 - High	1 2 3 4 OFF	Switch 1 ON Switch2 OFF
4 - Int.	1 2 3 4 OFF	Switch 1 OFF Switch 2 ON
6 - Standard	1 2 3 4 OFF	Switch 1 OFF Switch 2 OFF

- The pulse count may be selected from 2, 4, or 6 pulse counts before an alarm is signaled. Use switches 1 and 2 for this selection (see chart above).

NOTE: If both switches are ON, sensitivity will default to 4 pulse counts.

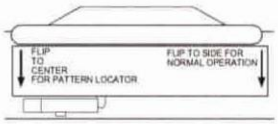
- Select Alarm LED setting. This is selected with Switch 3 on the DS918i and Switch 1 on the DS928i (The DS928i only has 2 switches; Switch 1 is for the Alarm LED setting, Switch 2 is not used.).
  - Switch 3 ON (DS918i) = Alarm LED lights upon Switch 1 ON (DS928i) alarm
  - Switch 3 OFF (DS918i) = Alarm LED disabled Switch 1 OFF (DS928i) regardless of alarm status
- Select Interval Time setting (DS918i only). This is selected with Switch 4. The interval time is the amount of time allowed to count the pulses before an alarm is signaled.
  - Switch 4 ON = 10 seconds of interval time.
  - Switch 4 OFF = 20 seconds of interval time.

NOTE: Ten seconds is the recommended setting.

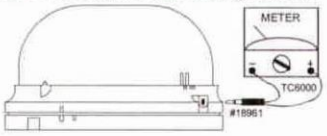
- Make sure the sensitivity pot (see diagram above) is set in the high position.

6.0 Walk Testing

NOTE: Walk testing should be done across the coverage pattern.



- Attach the chassis to the base.
- Apply power to the detector.
- Flip the visual pattern locator to the center position (see diagram). When this is engaged, the locater LED will turn on. Walk through the expected coverage area. When walking, look for the locater LED. When it is in sight, you are in the coverage pattern. When the LED is out of your sight, you are no longer within the coverage pattern.
- Flip the visual pattern locater back to the storage position.
- Walk test the detector. Wait at least one minute after putting the switch back to start walk tests. Observe the Walk test/Alarm LED while walking across the coverage area. It will light as you enter the coverage area.
  Walk test from both directions to determine the exact boundaries. Adjust the optical module and continue walk testing until the desired coverage pattern has been obtained.



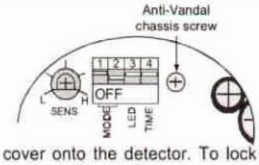
7.0 Final Tests

NOTE: Meter readings are very important in determining background disturbance levels and catch margin sensitivity.

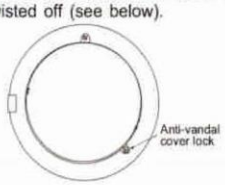
- Connect a 20,000 ohm/volt (or greater) DC VOM to the background noise voltmeter jack (see diagram). Use a TC6000 test cord with a #18961 adapter.
- Set the meter to read 3 VDC.
- The base reference level will read approx. 1.8 VDC. Thus, installations in quiet environments should have a steady meter reading between 1.7 and 1.9 VDC.
- Observe the meter while walk testing through the farthest edge of the coverage. If the peak VOM reading is less than 1.0 VDC, the detector may fail to respond at this distance if the temperature difference between the intruder and background is minimal. If this is so, re-align the optical module, and walk test again.
- Turn on all heating and cooling devices that will normally be in operation during times of protection. Stand away from the unit and outside the coverage area, and monitor the background noise for at least three minutes. The reading should not exceed 0.3 V DC. If the reading does exceed 0.3 VDC, eliminate the causing factor, or readjust the optical module.

8.0 Final Set-up

- Lock the chassis to the base. Tighten the Anti-Vandal chassis screw until the chassis can no longer be twisted off (see below).



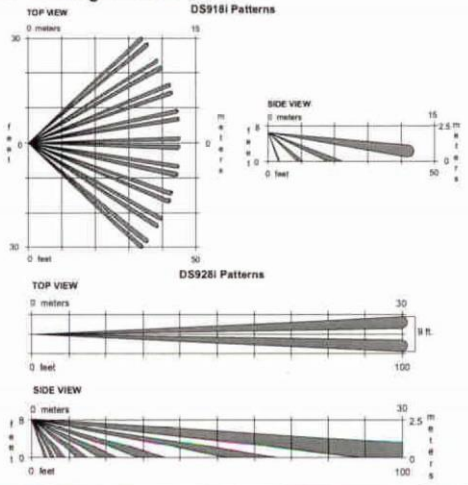
- Replace the cover onto the detector. To lock the cover to the chassis, tighten the Anti-vandal cover screw until the cover can no longer be twisted off (see below).



9.0 Maintenance

- At least once a year, the range and coverage should be checked. Follow the instructions in Sections 6.0 and 7.0.
- On a daily basis, the end user should walk through the far end of the coverage pattern. This will verify operation.

10.0 Coverage Patterns



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DS918i/DS928i Installation Instructions
P/N: 26003F 8/01

Installation Instructions
DS938Z Ceiling Mount
Passive Infrared Intrusion Detector with Self-Test

1.0 General Description

The DS938Z is a high performance passive infrared intrusion detector. It is equipped with advanced PIR detection and supervision circuits and is designed to provide an alarm condition upon detection of an intruder passing through its area of coverage.

Employing balanced dual-opposed sensing elements, the DS938Z passive infrared (PIR) detector makes use of the fact that all objects give off (emit) infrared energy, and that the warmer an object is, the greater the amount of infrared energy given off. The DS938Z uses PIR receiver technology designed to detect the change in infrared energy caused when a target of a different temperature from a stable background passes through its field of coverage.

The coverage pattern consists of sensor zones arranged to form a circular coverage pattern.

Using Motion Analyzer II circuitry, the detector must first see a change in infrared energy in one zone followed by a change of energy in the remaining zone. Therefore, disturbances that occur in only one finger do not constitute motion and are ignored. This "catch sensitivity" may be changed in the field by the installer to provide the degree of sensitivity required by the installation.

Self-test and supervision circuits provide reliable operation in a variety of installation environments. The result is a highly advanced detector offering superior performance with freedom from false alarms.

2.0 Specifications

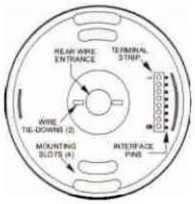
- **Coverage:** 360° by 60 ft. (18.3 m) diameter coverage when mounted on 8 to 18 ft. (2.4 to 5.5 m) high ceilings. Pattern consists of 64 zones grouped into 16 barriers, with one additional zone looking straight down from the unit (sabotage). Each barrier is 30 ft. (9.2 m) long and 4.4 ft. (1.3 m) wide at 30 ft. (9.2 m). Choice of two optical modules depending on ceiling height.

NOTE: For UL Certificated installations, the coverage is 360° by 54 ft. (16.5 m) when mounted from 10 to 13 ft. (3.1 to 4.0 m) using the AR8-13 Array and when mounted from 15 to 18 ft. (4.6 to 5.5 m) using the AR13-18 Array.

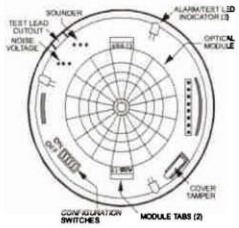
- **Input Power:** 6.0 to 15.0 VDC; 18 mA.
- **Standby Power:** There is no internal standby battery. Connect to DC power sources capable of supplying standby power if primary power fails. Eighteen mA-H required for each hour of standby time needed. *Four hours (72 mA-H minimum) are required for UL Certificated installations.*
- **Sensitivity:** Field selectable for Standard, Intermediate, or High.
- **Alarm Relay:** Silent operating Form "C" relay. Contacts rated 125 mA, 28 VDC maximum for DC resistive loads. *Do not use with capacitive or inductive loads.*
- **Tamper:** Normally Closed (with cover in place) tamper switch. Contacts rated at 28 VDC, 125 mA maximum.
- **Trouble Output:** A solid state open collector conducts to terminal 1 (-) when the detector is in a trouble condition. Maximum current load is 25 mA.
- **Temperature:** The storage and operating range is -20° to +120°F (-29° to +50°C). *For UL Certificated installations, the range is +32° to +120°F (0° to +50°C).*
- **Sonalert™ Connector:** Using a Sonalert™ type sounder (low voltage) will provide an audible tone when the unit is in alarm. *Use of the sounder is intended only as an aid for walk testing during installation.*

Sonalert™ is a trademark of Mallory.

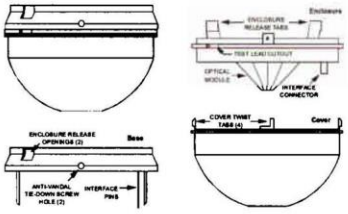
- **Optional Accessory:** TC6000 Test Cord.



Mounting Base



Top View of Enclosure with Cover Removed



3.0 Mounting

Select a location likely to intercept an intruder moving *across* the coverage pattern (review patterns on page 2). **The recommended mounting height is 8 to 18 ft. (2.4 to 5.5 m).**

detection systems

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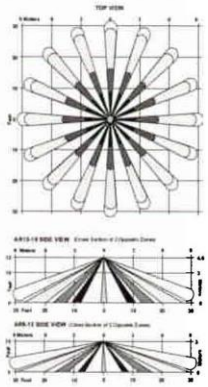


NOTE: The mounting surface should be solid and vibration free (e.g., drop tiles should be secured if the area above the tiles is used as an air return for HVAC systems).

- Do not mount near air handling system outlets, or in areas of extreme drafts.
- Remove the cover by turning it counterclockwise.
- Remove the base from the enclosure by pressing the two enclosure release tabs inward while lifting the enclosure away from the base.

HINT: Slightly rock the enclosure side-to-side during removal to overcome the friction caused by the base-to-enclosure terminal pins.

- Route wiring as necessary to the rear of the base and through the center hole.

NOTE: Be sure all wiring is unpowered (de-energized) before routing.

- Firmly mount the base. Depending on local regulations, the base may be directly surface mounted using anchors, mollies, or wing-nuts, or may be mounted to standard four inch octagonal or square electrical boxes.

NOTE: The DS938Z base will not completely cover a four inch square box. Where aesthetics are important, a four inch octagonal box is recommended.

HINT: Mounting to removable ceiling tiles is not recommended unless a sandwich is made of the base, ceiling tile, and a back plate behind the tile. Covers used for four inch octagonal and square boxes make a suitable back plate (when used with bolts and wing nuts, as an example).

4.0 Selecting the Optical Module (AR8-13 or AR13-18)

- Replace the enclosure onto the base.
- For ceilings between 8 and 13 ft. (2.4 and 4.0 m) from the floor, use the optical module marked AR8-13. This marking can be found next to the two optical module tabs.

  For ceilings between 13 and 18 ft. (4.0 and 5.5 m) high, use the optical module marked AR13-18.

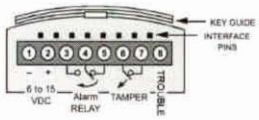
  To replace an optical module, push the optical module tabs towards the center until the module snaps free of the circuit board. Holding the new module by the tabs, snap the new module into place.

Avoid fingerprints on the mirrored surfaces. Should the mirrored surfaces become soiled or otherwise marked, they can be cleaned using a soft, clean cloth and any commonly available, mild window cleaner.

5.0 Wiring

CAUTION: ONLY APPLY POWER AFTER ALL CONNECTIONS HAVE BEEN MADE AND INSPECTED.

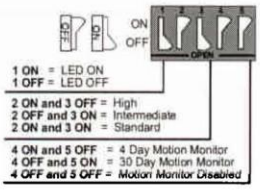
NOTE: Do not coil excess wiring inside unit.



- **Terminals 1 (-) & 2 (+):** Power limits are 6 to 15 VDC. Use no smaller than #22 AWG (0.8 mm) wire pair between the unit and the power source.
- **Terminals 3, 4, & 5:** Alarm relay contacts rated 125 mA, 28 VDC maximum for DC resistive loads. Use terminals 4 & 5 for Normally Closed circuits. *Do not use with capacitive or inductive loads.*
- **Terminals 6 & 7:** Normally Closed tamper contacts rated at 28 VDC, 125 mA.
- **Terminal 8:** Trouble Output.

6.0 Configuration Switch Settings

The DS938Z has several features that are controlled using the configuration switches.



6.1 LED Operation (S1)

- **ON:** Allows the Alarm/Test LED to operate when activated by motion.
- **OFF:** The LED will not operate on alarm activation, but will indicate a supervision trouble condition.

6.2 Sensitivity Mode (S2 and S3)

Sensitivity modes depend on the type of coverage desired and the installation environment.

- **Standard Sensitivity:** Tolerates environment extremes on this setting, but requires the largest amount of intruder motion to achieve an alarm.
- **Intermediate Sensitivity:** The recommended setting for most installations. Use in locations where an intruder is expected to cover only a small portion of the protected area. Tolerates normal environments on this setting. **The detector is shipped in Intermediate Sensitivity mode.**

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- **High Sensitivity:** The setting for fast response to intruder signals. For use only in extremely quiet environments where ceiling drafts, and thermal and illumination transients are not anticipated.

If both switches are in the OFF position, the unit will default to the Intermediate setting.

NOTE: Although the sensitivity modes provide different degrees of tolerance to environmentally caused alarms, the installer should assure peak background noise voltage readings do not exceed ±0.15 VDC. (See Section 8.0 Final Tests).

6.3 Motion Monitor (S4 and S5)

Set switches S4 and S5 for the desired Motion Monitor time (see Section 9.0 Supervision Features). **The detector is shipped with the Motion Monitor feature disabled.**

6.4 Signal Gain

The DS938Z permits selection of the signal gain depending upon the environment to be protected. The gain select jumper is located under the optical module.

- **High Gain:** Recommended for large coverage applications up to 60 ft. (18.3 m) in diameter. The DS938Z is shipped in this setting. If the gain select jumper is missing, the unit will default to High Gain.
- **Low Gain:** Recommended for applications where the area to be covered is 40 ft. (12.2 m) or less in diameter and for applications where High Gain may be too sensitive for environmental extremes.

NOTE: Setting the DS938Z for Low Gain reduces the coverage area to 40 ft. (12.2 m) in diameter.

7.0 Setup and Walk Testing

- Attach a TC6000 Test Cord to the Noise Voltage terminals. Since the outside terminals are common, polarity is not important and the black lead may be toward or away from the optical module.
- Attach a Sonalert™ to the sounder pins at this time if one will be used during walk testing.

NOTE: The use of a Sonalert™ type device (sounder) will provide an audible tone during the time the unit is in alarm. Of the three available connector pins, the center pin is positive (+) with respect to either outside pin (outside pins are common (-)).

Sonalert™ is a trademark of Mallory.

- **Place the cover on the unit**, and twist-lock it clockwise into place.

NOTE: Be sure the TC6000 and Sonalert™ leads are dressed through the cutout.

- Apply power to the unit.
- Wait at least two minutes, after applying power, to start walk tests.

NOTE: Walk testing should be done across the coverage pattern as shown.

- The edge of the coverage pattern is determined when the Alarm/Test LED indicator (and optional Sonalert™, if installed) first turns on.
- Walk test the unit from all directions to determine the boundaries.
- After completion of the walk tests, remove the Sonalert™ (if installed).

8.0 Final Tests

8.1 Noise Measurement

NOTE: Meter readings are very important in determining background disturbance levels and catch margin sensitivity.

- Connect a 20,000 ohm/volt (or greater) DC VOM to the Noise Voltage connector using the TC6000 as shown. Set meter scale for about 3.0 VDC.
- The base reference level for reading background noise or target voltages is approximately 2.0 VDC. Installations in quiet environments, therefore, will result in a steady meter reading between 1.9 and 2.1 VDC. Look for areas and sources of thermal disturbances if the meter fluctuates greatly.

8.2 False Alarm Prevention

- Turn on all heating and cooling sources that would normally be in operation during times of protection. Stand away from the unit and outside the coverage pattern, then monitor the background noise for at least **three minutes**.

  Readings should not deviate from the reference level more than ±0.15 VDC. For readings outside these limits; eliminate the cause, rotate the unit slightly, or mask out the mirror segment(s) looking down at the thermal disturbance.

8.3 Coverage Margin

- Again walk across the farthest edge of required coverage.

  A minimum voltage change of 1.0 VDC from the reference level is required in the wintertime when the background temperature is cool. This will make up for summertime, when the background is warmer. If testing the unit in the summertime, the minimum recommended voltage change is 0.75 VDC.
- When testing is completed, remove the TC6000 Test Cord, and twist-lock the cover into place.

9.0 Supervision Features

The DS938Z performs several supervision features that, combined with the advanced motion detection capabilities of the detector, provide an extremely high level of security. A supervision trouble condition is indicated at the detector by the Alarm/Test LED (see the Supervision Display Chart).

- The LED indicates the cause of the supervision trouble using coded pulses. The supervision trouble signal activates the Trouble Output available at terminal 8, which should be connected to a 24-hour zone.

The supervision features function as follows:

Supervision Display Chart

LED	CAUSE
ON	Unit Alarm
2 Flashes	Motion Monitor Timeout
4 Flashes	**PIR Self-test Failure**

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OPTEX
Sensing Innovation

PHOTOELECTRIC DETECTOR

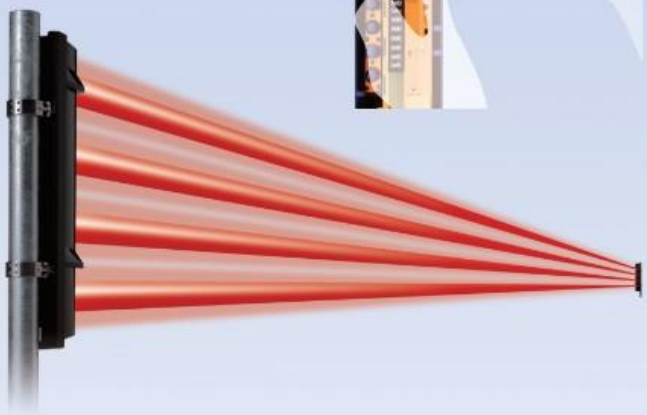
Smart Line™ series

SL-200QN: 60m/200ft.
SL-350QN:100m/350ft.
SL-650QN:200m/650ft.

Sniper viewfinder™ with 2X magnification

Conventional

Sniper viewfinder



Various option

Anti Bird Cap ABC-4
Keep birds and small animals off the detector to reduce false alarms.
Stop rain and snow streaming in front of the detector to keep the sensitivity.

Back Cover BC-4
Conceal the back side of pole mounted detector.

Pole Side Cover PSC-4
Conceal the gap between two pole mounted detectors in back to back.

Conduit Bracket CBR-4

Beam Alignment Unit BAU-4
Align optical axis automatically. (applicable only to receiving units)

New Mechanical Design

Wide beam & United appearance

The short range mode, SL-200QN with a wide beam pitch is now available. It dramatically reduces false alarms caused by birds and falling leaves. Moreover, it is also important that forms of long and short beams are united.

Slim body & Light weight

20% reduction of the body size and 15% reduction of the weight come together in the SL series.

Beam blocking plate

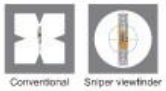
The plate can firmly be fixed on the lens unit without fear to be blown off by wind. The plates can be stored in the back of the front cover.

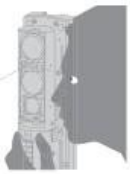
Anti frost design (Hood design)

The hoods are positioned on the both of the upper beam and the lower beam to secure a high and stable beam power by preventing frost from attaching on the front cover.

Sniper viewfinder™ with 2X magnification

The new telescope lens has a high level of visibility for optical alignment work.





IP65 water proof structure

Rubber packing is used for all conceivable points where water or dust may penetrate, such as wiring holes, wire ports and the outer openings on chassis.

Vivid interior color

Easy-to-see vivid interior color for optical alignment.

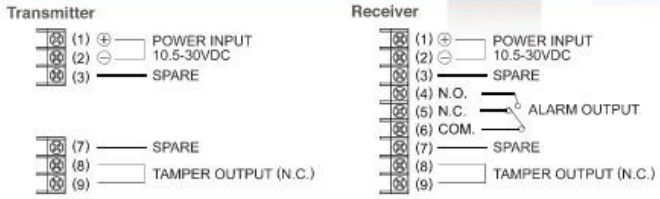
Alignment dial

The alignment no longer requires a screwdriver.
All you need is touch by your fingers for precise adjustment.

Quad beam with aspherical lenses

The high-grade aspherical lens create more sharply defined and precise active infrared beams.

TERMINAL



Heating unit HU-3 (option)

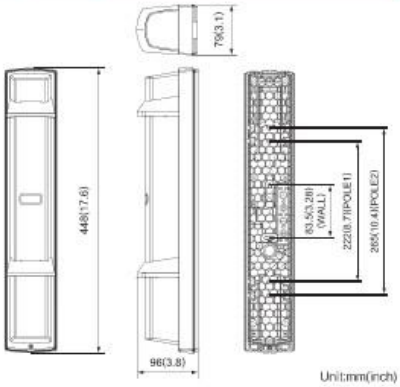
- **Power input** : 24VAC/DC
- **Current draw** : 420mA(max.) (Per 1 unit)
- **Thermo switch** : 60°C (140°F)

SPECIFICATIONS

Model		SL-200QN	SL-350QN	SL-650QN
Maximum detection range		60m / 200ft.	100m / 350ft.	200m / 650ft.
Maximum arrival distance		600m / 2000ft.	1000m / 3500ft.	2000m / 6500ft.
Detection method		Quad infrared beam interruption detection		
Interruption time		Variable between 50/100/250/500 ms (4 steps)		
Power source		10.5 - 30VDC		
Current draw		38mA (Transmitter:8mA, Receiver:30mA)	39mA (Transmitter:9mA, Receiver:30mA)	40mA (Transmitter:10mA, Receiver:30mA)
Output	Alarm output	Form C relay : 30VDC, 0.2 A		
	Alarm period	2sec (±1) (Nominal)		
	Tamper output	N.C. (contact output) : 30VDC, 0.1A Opens when cover removed.		
Operating temperature		-25°C - +60°C (-13°F - 140°F)		
Operating humidity		95% (max.)		
Alignment angle		±90° Horizontal, ±10° Vertical		
Dimension		H x W x D mm (inch) : 448(17.6) x 79(3.1) x 96(3.8)		
Weight		2400g(84.7oz) (Total weight of Transmitter + Receiver, excluding accessories)		
International protection		IP65		

* Specifications and design are subject to change without prior notice.

DIMENSIONS



Unit:mm(inch)

OPTEX CO., LTD. (ISO 9001 Certified / ISO14001 Certified)
5-8-12 Ogoto, Otsu, Shiga, 520-0101 Japan
TEL +81(0)77 579 8670 FAX +81(0)77 579 8190 http://www.optex.co.jp/e/

OPTEX INCORPORATED (USA)	http://www.optexamerica.com/
OPTEX (EUROPE) LTD. (UK)	http://www.optex-europe.com/ (ISO9001 Certified)
OPTEX SECURITY SAS (FRANCE)	http://www.optex-security.com/
OPTEX KOREA CO., LTD. (KOREA)	http://www.optexkorea.com/
OPTEX SECURITY Sp. z o.o. (POLAND)	http://www.optex.com.pl/
OPTEX (DONGGUAN) CO., LTD. SHANGHAI OFFICE (CHINA)	http://www.optexchina.com/

No. 75124-00-15747-1206

PART 3 - EXECUTION

3.1 INSTALLATION

A. General
   1. Follow manufacturers recommended guidelines for installation.
   2. Install motion detectors in all public areas in basement, ground floor and first floor.

B. Components
   1. IDS Control Panel
      a. Place control panel and associated expansion boards in SEC (NEMA Type-1 enclosure) with ACAMS equipment in nearest TR room.
      b. Utilize ACAMS power supplies to power control panel and associated expansion boards. Do not use plug-in transformers.
      c. Provide standoff brackets to mount control boards to perforated panel within enclosure.
      d. Place power supply and associated hardware in same location.
      e. Install supervisory and end of line resistors as required.
      f. Coordinate installation of phone jack in IDS control panel enclosure with telecommunications contractor for communications to the alarm receiver located in the main reception office.
   2. Keypads
      a. Coordinate exact location with head of facility security.

3.2 PROGRAMMING

A. Prior to the completion of construction, schedule a meeting with the Owner's IT and Security representatives to determine the following programming criteria:
   1. Zone or alarm point descriptions
   2. User authority levels to arm/disarm areas or alarm partitions
   3. Auto arm/disarm schedules
   4. Interface requirement with ACAMS
   5. Dispatch response from individual alarm points
   6. Password and call list information

B. Document the results of the meeting and perform necessary programming to achieve the Owner's requests. Program and setup the system such that no additional programming other than entering new access codes is required.

END OF SECTION 28 16 00

SECTION 28 23 00 - IP VIDEO SURVEILLANCE SYSTEM

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1- GENERAL

1.1 RELATED SECTIONS

A. 26 05 00 – Grounding and Bonding
B. 26 05 29 – Electrical Hangers and Supports
C. 26 05 33 – Raceway and Boxes

1.2 DESCRIPTION OF WORK

A. Provide licenses, camera equipment, and any other items required. The installation shall comply with applicable codes and standards in effect at the job site and as indicated in the Specifications and Drawings.

B. The contractor shall supply DISD Technology with enough licenses to cover the additional cameras required for the project. Licenses will be required for Avigilon Unity Video Surveillance System.

C. The contractor shall coordinate with other system vendors, where appropriate, to facilitate equipment installation, scheduling, protection of equipment and access to the project site in order to provide the owner a substantially complete project in a timely manner.

F. The Contractor is responsible for coordinating all electrical work required on this project for connection of cameras, conduit, and power supplies. The contractor shall provide a complete turnkey solution and be responsible for the complete installation of a security camera system. Power requirements for the servers and in-wall conduits shall be provided by the project's electrical contractor. Any additional power requirements for power supplies and addition pathway conduits/sleeves are to be provided by the system proposing/installing contractor's licensed electrician.

1.3 QUALITY ASSURANCE

A. Installer Qualifications:
   1. The proposing/installing contractor shall be a dealer/integrator of the VMS Manufacturer authorized to sell, install, program, train, and service the proposed manufacturer's system.
   2. The proposing/installing contractor shall be licensed by the State, in which the work is being performed in, as a security services contractor to design, sell, install, and service security systems.
   3. The proposing/installing contractor shall have the ability to provide 24/365 emergency service with factory trained service technicians.
   4. The proposing/installing contractor shall have personnel on their staff that have been actively engaged in the business of designing, selling, installing, and servicing video surveillance systems for at least ten (10) years.
   5. The contractor shall be certified by the manufacturing company in all aspects of design, installation and testing of the products described herein. Each contractor shall furnish with their submittal a letter from the manufacturer indicating they are a dealer in good standing.
   6. The contractor must be certified by the manufacturer of the products, adhere to the engineering, installation and testing procedures, and utilize the authorized manufacturer components and distribution channels.

7. The contractor shall be experienced in all aspects of this work and shall be required to demonstrate direct experience of recent systems of similar type and size. The contractor shall own and maintain tools and equipment necessary for successful installation and testing of video surveillance distribution systems and have personnel who are adequately trained in the use of such tools and equipment.
8. A resume of qualifications shall be submitted with the Contractor's proposal indicating the following:
    a. A list of five recently completed projects using the product proposed of similar type and size with contact names and telephone numbers for each.
    b. A list of test equipment proposed for use in verifying the installed integrity of metallic cable systems on this project.
    c. A technical resume of experience for the contractor's Project Manager and on-site installation supervisor who shall be assigned to this project.
    d. A list of technical product training attended by the contractor's personnel that shall install the video surveillance system shall be submitted.
    e. Any subcontractor who shall assist the video surveillance contractor in performance of this work shall have the same training and certification as the video surveillance contractor.
9. All Contractors must submit, to the project's technology consultant, prior to starting any work the factory training certificates for all personnel that will be working on the intrusion detection system. No person is allowed to work on the system without proper manufacturer's certification.

B. The entity providing pricing to furnish and install the system specified within this specification section and the physical installing entity of this system shall be one in the same. Absolutely no subcontracting on any portion of this system, by the system's proposing entity, will be allowed.

C. Contractor must be a current integrator of solution in the closest major metropolitan area, have a permanent office located within 150 miles of the project, and be able to include information on current support staff to be able to service this client.

D. The Owner's representative reserves the right to reject all or a portion of the work performed, either on technical or aesthetic grounds.

1.4 REGULATORY REQUIREMENTS

A. Standards: All work shall be performed in accordance with the latest revisions of the following standards and codes:
1. Local Building Code
2. Local Electrical Code
3. NEC National Electrical Code

B. Other references:
1. TIA/EIA-568-B - Commercial Building Telecommunications Wiring Standard
2. EIA/TIA-569 - Commercial Building Standard for Telecommunications Pathways and Spaces.
3. TIA/EIA-606 - The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
4. TIA/EIA-607 - Commercial Building Grounding and Bonding Requirements for Telecommunications
5. TIA/EIA TSB 67 - Transmission Performance Specification for Field Testing of Unshielded Twisted-Pair Cabling Systems.
6. ISO/IEC 11801 - Generic Cabling Standard
7. EN 50173 - Generic Cabling Standards for Customer Premises

C. Governing Codes and Conflicts: If the requirements of these specifications or the Project Drawings exceed those of the governing codes, regulations, and manufacturer installation requirements, then the requirements of these specifications and the drawings shall govern. However, nothing in the drawings or specifications shall be construed to permit work not conforming to all governing codes, regulations, and manufacturer installation requirements.

1.5 SUBMITTALS

A. Product Data:

1. Within fourteen (14) days of Notice to Proceed, the system installer shall furnish the following in a single consolidated submittal:
    a. Permits: The Contractor shall obtain all required permits and provide copies to the Owner/Architect/Engineer.
    b. Product Literature: Complete manufacturer's product literature for all cable, termination components, cable supports, cable labels, field devices, and other products to be used in the installation. In addition, whenever substitutions for recommended products are made, samples (when requested by the Owner/Designer) and the manufacturer's supporting documentation demonstrating compatibility with other related products shall be included. The submittal shall have some type of distinguishing marker or pointer to indicated what specific product is to be provided
    c. Testing: Proposed system test result forms and a list of instrumentation to be used for systems testing.
    d. Specification Compliance: A letter shall be provided stating, by section and subsection, that the system installer complies with the ENTIRE specification section. If the installer intends to deviate from any portion of the specifications, a detailed explanation of reason in which the installer would like to deviate shall be provided in addition to the specification compliance letter.
    e. Certifications: The contractor shall submit all of the following certifications and the certifications must contain dates which are valid from the date of proposal and not expirer any sooner than 12 months after substantial completion of the project.
        1) Manufacturer's Authorized Dealer/Installer Certification: This certification must be held by the proposing/installing contractor and state that the proposing/installing contractor is and authorized dealer/installer of the system specified within the project specifications. The certification must have been obtained by the office that is within a 75 mile radius of the project's location.
        2) Installer Certification: This certification must be held by at least 25% of the, on-site, staff and be made available at the site if requested by the owner, architect, and/or project's technology consultant.
        3) Licenses: This includes all licenses required by the state in which the work is being performed, the federal government, local authorities having jurisdiction, and any organization in that governs the specific system

B. Shop Drawings:

1. Submit the following items, for Owner review and approval, within twenty-eight (28) days of notice to proceed:
    a. Proposed circuit routing and circuit grouping plan prepared by a system registered designer. The designer's certification must be current.

Identifiable, separate routing shall be shown for both the station cabling and any backbone trunk cabling.

b. In addition to the cable routing, the submitted drawings shall indicate the following, even if the following is expected to be provided by the project's electrical or general contractor:
   1) Location of all control equipment and remote power sources
   2) Locations of all field devices and outlets
   3) Location of wall penetrations (all penetrations shall be sleeved and contain protective bushings at both ends)
   4) Location of sleeved wall pass-thru
   5) Size of sleeve at each location installed
   6) Quantity of cable passing through each sleeve
   7) Location of drops in each room (quantity or labeling of drops are not required in the submittal plans. Labeling shall be provided in the closeout plans and quantities shall be as per the contract documents, addendums, and issued changes. Each item shall be labeled for the type of outlet that it is)
   8) Conduit routing, size, quantity, and stub-up locations for any floor mounted outlets or outlets installed in casework.

c. Drawing Compliance: A letter shall be provided stating that the system installer complies with the ENTIRE project drawing, including all general, keyed, and notes to contractor. If the installer intends to deviate from any portion of the specifications, a detailed explanation of reason in which the installer would like to deviate shall be provided in addition to the specification compliance letter.

C. Close-out Procedures:

1. Four (4) copies of the following documents shall be delivered to the Architect/Engineer at the time of system acceptance. One (1) final copy of the same documents shall be delivered directly to the project's Technology Consultant upon final closeout of the project. The closeout submittals shall include:
   a. Inspection and Test Reports: During the course of the Project, the Contractor shall maintain an adequate inspection system to ensure that the materials supplied and the work performed, conform to contract requirements. The Contractor shall provide written documentation that indicates that materials acceptance testing was conducted as specified. The Contractor shall also provide documentation, which indicates that all cable termination testing was completed and that all irregularities were corrected prior to job completion.
   b. Provide complete test reports for all cabling and devices that comprise system as outlined in this document.
   c. Include the Name, address and telephone of the authorized factory representative with a 24-hour emergency service number.
   d. The manual shall also include Manufacturer's data sheets and installation manuals/instructions for all equipment installed and a list of recommended spare parts.
   e. Generic or typical owner's instruction and operation manual shall not be acceptable to fulfill this requirement.
   f. An up-to-date record ("as-built") set of approved shop drawing prints that have been revised to show each and every change made to the structure cabling system from the original approved shop drawings. Drawings shall consist of a scaled plan of each building showing the placement of each individual item of the technical cabling system equipment as well as raceway size and routing, junction boxes, and conductor size, quantity, and color in each raceway.

g. As-built Drawings shall include cable pathways, device locations with correct labeling, control equipment locations, remote power supply locations, cross connect locations, lightning protection locations, and MDF/IDF locations. The as-built drawings shall be prepared using AutoCad 2002 or later. Provide the Owner with electronic versions of the as-builts on CD media and (1) hard copy per binder.

h. All drawings must reflect point to point wiring, device address and programmed characteristics as verified in the presence of the engineer and/or the end user unless device addressing is electronically generated, and automatically graphically self-documented by the system.

i. A copy of the manufacturer's warranty on the installed system.

j. Any keys to cabinets and/or equipment and special maintenance tools required to repair, maintain, or service the system.

k. Operating and Maintenance Instructions for all devices within the system. These instructions shall reflect any changes made during the course of construction, and shall be provided to the Owner, for their use, in a three-ring binder labeled with the project name and description. (4 copies)

l. Upon completion of the work and at a time designated by the Architect or owner, provide formal training sessions for the Owner's operating personnel to include location, operation, and maintenance of all included systems and equipment. Provide a copy of the sign in and training sign off sheets

m. One (1) 30" x 42" laminated floor plan sheets illustrating technology drops and cable designation. Contractor shall provide one complete floor plan sheet for each system panel and remote power supply location.

PART 2 -PRODUCTS

2.1 GENERAL

A. The Contractor is responsible for providing all incidental and/or miscellaneous hardware not explicitly specified below as required for a complete and operational system.

B. Materials shall be as listed or shall be approved equivalent products of other manufacturers meeting the intent and quality level of the specifications. All approved equivalent products shall be published by addendum ten days prior to proposal for Architect/Engineer review.

D. All equipment and materials used shall be standard components, regularly manufactured, regularly utilized in the manufacturer's system.

E. All systems and components shall have been thoroughly tested and proven in actual use.

E. All systems and components shall be provided with the availability of a toll free 24-hour technical support phone number from the manufacturer. The phone number shall allow for immediate technical assistance for either the dealer/installer or the end user at no charge.

F. All systems and components shall be provided with an explicit manufacturer warranty.

2.2 CABLE AND INSTALLATION

A. Each power cable shall be individually fused at the power supply so a short in one power cable will blow that fuse and not affect the other cameras. The power supply will be UL

listed in an approved enclosure. It is the responsibly of the Contractor to size the power supply to handle the full load of the cameras.

B. All required network cable to each camera location on this project shall be provided by structured cabling system installer currently installing new system on site. Security camera contractor is responsible for providing and installing all power wiring for exterior cameras if needed.

C. Provide all penetrations and all conduits as necessary for installation of security camera installation.

D. All exterior penetrations require necessary weatherproofing to avoid moisture penetration.

E. All outdoor cable runs underground shall be rated for underground use.

F. Provide all power circuits required for the servers and camera power supplies.

G. Contractor shall not run any power cabling for any security equipment on rack tray system due to emi considerations. Contractor shall provide individual cabling support for all low voltage power cabling.

H. All cabling for entire project shall be installed at 5'-0" intervals in dedicated support system using supports such as j-hooks or saddle support systems. Cable supports will be securely attached directly to building structure. Do not attach cabling or supports to ductwork, piping, grid hangers, conduit, or equipment.

2.4 PROPOSALS

A. All proposals shall be in the format as requested by the General Contractor.

2.5 CAMERAS

A. Camera Types:

a. Interior Cameras
- Type 1 – Avigilon - 6.0C-H5A-DC1-IR
- Type 2 – Avigilon - 6C-H5DH-DO1-IR
- Type 3 – Avigilon – 12C-H5A-4MH
- Type 4 – Avigilon – 12.0W-H5A-FE-DC1
- Type 5 – Avigilon – 8.0C-H6SL-D01-IR
- Type 6 – Avigilon - 6C-H5DH-DO1-IR
- Type 7 – Avigilon – 24C-H5A-3MH
- Type 8 – Avigilon – 32C-H5A-4MH
- Type 9 – Avigilon – 3.0C-HD-LP-B1

b. Contractor to provide all requisite mounting for all cameras. Refer to drawings for camera locations and anticipated mounting locations.

B. Field Of View Determination by the contractor as necessary for fixed camera locations shall be performed at no additional cost to provide the view desired by the owner. Contractor shall coordinate all final camera views and locations with owner for final approval. Contractor shall be contractually bound to return to the site two times, during the first three months of the building normal day to day operations, to adjust cameras views after the owner's staff has had time to view the system and discover any locations where desired

adjustments are needed.

C. Interior cameras should be placed in ceiling tile unless ceiling is more than 12 feet tall in which case the camera will be placed in the wall at a height of 10 feet above finished floor.

D. Ceiling mounted cameras shall be installed with the weight of the camera being supported by the building structure. At no point should the weight of any camera be supported by the ceiling tile.

E. All Exterior cameras installed shall be focused at night-time in black and white mode to insure the best possible view.

2.6 SERVERS

A. An Avigilon AINVR-Premium Plus Server with appropriate amount of storage will be supplied to support 30 days of video recording and viewing, with appropriate video card to support analytic searches.

2.7 ADDITIONAL REQUIREMENTS

A. All equipment will be covered by a minimum of 5 years to include any licensing.

2.12 Provide all additional equipment required for a fully functional system.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Cable Support:
1. All wire not installed inside conduit or a designated cable tray system shall be installed in a dedicated cable support system for the entire run of each cable. Including, but not limited to service loops.
2. All cable installed shall be attached to the support system with plenum rated Velcro and a plenum rated Velcro tie shall be installed between each cable support to keep wires neatly bundled throughout the entire run. Tie wraps will only be allowed to be used inside the control panels as required to manage the wires within each type of panel.
3. Provide at least 10’ of service loop at both headend and camera end for entire project.
4. Do not route cable through webbing or structural steel.

Conduit / Raceway:
1. Refer to Section 27 10 00.

B. Fire Wall Penetrations: The Contractor shall avoid penetration of fire rated walls and floors wherever possible. Contractor shall also seal all floor, ceiling and wall penetrations in fire or smoke barriers and in the wiring closet.

C. Wall Penetrations: Where penetrations are necessary, they shall be sleeved with metallic conduit and resealed with an Underwriter Laboratories (UL) approved sealant.

D. Provide three sided pre-finished metal hood and seal to wall where conduit penetrates exterior wall.

E. Install new roof mounted conduits on portable pipe supports – (low profile type), as

manufactured by Portable Pipe Hangers or Advanced Support Products. Provide roof protection pads under each support. Coordinate location and routing with design engineer prior to rough-in or installation of system.

F. Do not install wall mounted cameras into metal fascia. Ensure they are mounted into brick, and sealed top and sides (not bottom)

3.2 WIRING INSTALLATION

A. General:
1. Cabling between wiring closet and camera locations shall be made as individual home runs. No intermediate splices may be installed or utilized between the wiring closet and the camera location.
2. All cable must be handled with care during installation so as not to change performance specifications.

B. Placement: All cabling and associated hardware shall be placed so as to make efficient use of available space. All cabling and associated hardware shall be placed so as not to impair the Owner's efficient use of their full capacity.

3.3 DOCUMENTATION

A. Labels: The Contractor shall label all outlets using permanent machine engraved labels approved by the Owner. Label patch panels in the wiring closet to match those on corresponding camera locations. The font shall be at least one-eighth inch (1/8") in height, block. All labels shall correspond to as-builts and to final test reports.

B. Contractor shall ensure complete typed labeling of all cameras with numbers that correspond to locations on video server. Labeling system shall correspond to the Owner's labeling system. Verify with Owner. Provide tags (black letters on white labels, plastic coated) on all cables and outlets.

C. All cables shall be labeled at both ends with a machine label and all terminations shall be stenciled with a typed label for quick circuit identification. Labeling shall conform to TIA/EIA standard 606 and include interconnect cable identification numbers.

D. A floor plan, clearly labeled with all numbered camera locations, shall be included in the as-built plans.

3.4 CABLE TESTING - BY MANUFACTURER'S REQUIREMENTS

A. Notification: The Owner/Architect/Engineer shall be notified one week prior to any testing so that the testing may be witnessed.

B. Final Acceptance: Before requesting a final acceptance, the Contractor shall perform a series of end-to-end installation performance tests. The Contractor shall submit for approval a proposal describing the test procedures, test result forms and time table for all copper and fiber optic cabling.

C. Procedures: Trained personnel shall perform all testing. Acceptance of the test procedures discussed below is predicated on the Contractor's use of the recommended products and adherence to the inspection requirements and practices set forth. Acceptance of the completed installation shall be evaluated in the context of each of these factors.

D. Errors: When errors are found, the source of each error shall be determined, corrected and the cable retested. All defective components shall be replaced and retested. Retest results must be entered on the test results form. All corrections shall be made prior to final

acceptance test.

3.5 INSPECTION

A. Conformance to the installation practices covered above are to be verified when completed. In some cases, the Owner/Architect/Engineer may observe before acceptance.

3.6 WARRANTY

A Guarantee and warrant all equipment provided for a period of 3 years following date of substantial completion, or a period equal to the stated guaranty/warranty offered by the product manufacturer, whichever is the longest in duration.

B. Labor and all other costs as necessary to maintain the equipment in operating condition as intended by the product manufacturer after a period of 1 year shall be negotiated with the owner upon project completion.

END OF SECTION 28 23 00

SECTION 28 46 01 - FIRE ALARM AND SMOKE DETECTION SYSTEM WITH VOICE EVACUATION

PART 1 - GENERAL

1.1 SCOPE

A. The contractor shall furnish and install a complete distributed microprocessor based 24VDC, electrically supervised, MULTIPLEX fire alarm and voice evacuation communication system as specified herein and indicated on the drawings The system shall include, but not be limited to, all control equipment, remote transponders, power supplies, signal initiating and signaling devices, conduit, wire, fittings, and all other accessories required to provide a complete and operable system

B. The system shall operate as a non-coded, continuous sounding system which will sound alarm devices until manually silenced, as herein specified

C. The system shall be wired as a Class A supervised system for all circuits

D. The Fire alarm system shall be fully designed, permitted, documented, installed, and inspected by a licensed fire alarm engineer. The fire alarm engineer shall be solely responsible for a code compliant system, meeting the criteria of Dallas ISD guidelines, and local code adaptations of the local AHJ. Provide all necesary devices, as guided by device locations suggested on the Electrical drawings. Devices shown on the electrical plans are suggestive locations only, and may not depict all required devices and locations.

1.2 CODES AND STANDARDS

A. The system shall comply with the applicable Codes and Standards as follows:
   1. National Electrical Code - Article 760
   2. National Fire Protection Association Standards:
      a. NFPA 70 NEC
      b. NFPA 72 National Fire Alarm Code (1996)
      c. NFPA 90A Air Conditioning
      d. NFPA 101 Life Safety Code
      e. UL 1971 Visual Devices
      f. ANSI 117.1 Visual Devices
   3. Local & State Building Codes (Including all adopted amendments)
   4. Texas Accessibility Standards (TAS)
   5. American’s with Disabilities Act (ADA)
   6. Requirements of Local Authorities having Jurisdiction
   7. Underwriters Laboratory Requirements and Listings for use in Fire Protective Signaling Systems as follows:
      a. UL 864 Control Panels (9th Edition)
      b. UL 268 Smoke Detectors - Systems
      c. UL 268A Duct Smoke Detectors
      d. UL 521 Heat Detectors
      e. UL 228 Door Holder-Closers
      f. UL 464 Audible Signaling Appliances
      g. UL 1971 Visual Signaling Appliances
      h. UL 38 Manual Alarm Stations

1.3 ACCEPTABLE MANUFACTURERS

A. All equipment, materials, accessories, devices, etc covered by the specifications and/or noted on the contract drawings shall be new and unused and be U L listed for their intended use

B. All references to manufacturer's or supplier's model numbers and other pertinent information herein is intended to establish a minimum standard of quality, performance and features required All equipment proposed as an EQUAL to that specified shall COMPLETELY conform to the specifications herein

C. Equipment of other manufacturer's or supplier's may be considered as an equal to that specified provided that completely marked and identified catalog sheets of all proposed equipment is provided to the architect/ engineer for review ten (10) days prior to the date of bid for evaluation In addition, a list of the contractor's qualifications and any exceptions to the specifications must be provided for review Approval for any such substitution of equipment must be obtained in writing from the architect/engineer five (5) days prior to bid

D. Provide the following manufacturers:
   1. Notifier
   2. others acceptable by Dallas ISD pre-approval

1.4 GENERAL REQUIREMENTS

A. Contractor Qualifications:
   1. The equipment supplier shall be an authorized and designated representative of the Fire Alarm Manufacturer to sell, install, and service the proposed manufacturer's equipment
   2. The equipment supplier and installing contractor shall be licensed by the State Fire Marshall to sell, install, and service fire alarm systems as required by Article 5 43-2 of the Texas Insurance Code
   3. The installing contractor and/or equipment supplier shall have on his staff a minimum of three (3) installation superintendents who are licensed by the State Fire Marshall's office for such purpose and under whose supervision installation, final connections, and check out will take place as required by the Texas Insurance Code
   4. The installing contractor or equipment supplier shall have on staff a minimum of one (1) certified NICET Level III state licensed fire alarm planner under whose supervision system design shall take place
   5. The installing contractor shall provide 24 hour, 365 days per year emergency service with qualified and state licensed service technicians
   6. The installing contractor shall have been actively engaged in the business of selling, installing, and servicing fire alarm systems for at least ten (10) years

1.5 SUBMITTALS

A. The installing contractor and/or equipment manufacturer shall provide complete and detailed shop drawings and include:
   1. Control panel configuration including wiring and interconnection schematics
   2. Complete point to point wiring diagram showing terminal connections to all system devices
   3. Riser wiring diagram and associated zoning/addressing configurations with associated conduit sizes

4. Complete floor plan drawings locating all devices associated with the fire alarm system Floor plan drawings shall include conduit and wiring routing complete with conduit sizing and number of conductors by type Floor plans shall be on AutoCAD v 12
5. Factory data sheets on each piece of equipment to be used and so marked as to model, dimensions, size, voltage, and configuration
6. Detailed system description in this specification format describing system functions and operation All specification variations and deviations shall be clearly noted and marked
7. Complete Bill of Material for reference
8. Programming matrix defining all input/output functions and zoning
9. Power supply and battery calculations.
10. Written certification from the manufacturer stating that the distributor is authorized to sell, service and install the proposed fire alarm system.

B. All submittal data will be in bound form with contractor's name, supplier's name, project name, and state fire alarm license number adequately identified

C. Only basic equipment devices have been shown on the contract drawings Specific wiring between equipment/devices has not been shown It is the contractor's responsibility to submit for approval the COMPLETE ENGINEERED system configuration and layout showing all devices, wiring, conduit, and locations along with other required information as specified herein

1.6 COORDINATION

A. It shall be the responsibility of the installing contractor to coordinate all requirements surrounding installation of the fire alarm system with all trades including, but, not exclusive of: electrical contractor, sprinkler contractor, and HVAC/controls contractor and intercom system. Adequate coordination shall be provided to insure proper installation and interface to all peripheral items required to interact with the fire alarm and communication system to provide a complete and functional life safety system.

PART 2 - PRODUCTS

2.1 SYSTEM FUNCTIONAL OPERATION

A. ALARM DETECTION
1. When a fire alarm condition is detected via the main fire control panel by any of the system alarm initiating devices, the following functions shall occur:
   a. The system common alarm LED on the CPU Module shall flash The internal audible trouble device shall sound Acknowledging the alarm condition shall silence the audible trouble device and revert the flashing common alarm LED's to a steady state
   b. An 640 character back-lit LCD Display shall indicate all applicable information associated with the alarm condition including: zone, device type, device location, and time of alarm Location and zoning messages shall be custom field programmed to respective premises
   c. Appropriate status change messages shall be transmitted to the system printer
   d. Any remote annunciator LCD display associated with the alarm zone shall be activated as herein specified
   e. The remote signaling or municipal tie connection shall be activated relaying the alarm signal to an approved central station (central station connection and service provided by Owner)

f. All automatic events programmed to the alarm point shall be executed and the associated indicating devices and/or outputs activated
g. Alarm tones shall sound on the floor of incidence, floor above and floor below Upon expiration of the alert tone, a digitized predetermined voice evacuation message shall be automatically transmitted to the effected floors The system shall have the capability to generate multiple distinct digital messages as determined by event initiated programs
h. Flash all strobe lights (visual signals) on the fire floor, floor above, and floor below
i. Activate the stair pressurization fans.
j. Recall elevators to ground floor as specified herein, or to the alternate floor if the alarm condition originates on the ground floor.
k. Unlock all stair tower doors.

2. Elevator lobbies shall be provided with smoke detectors, identified as individual points. Upon activation of both of the detectors associated with an elevator lobby, all elevators shall be automatically recalled to the ground floor. In the event of a fire on the ground floor, all elevators shall be automatically recalled to the 1st terminus floor above the ground floor served by the respective elevator bank.
3. Activation of the heat detector at the top of each elevator shaft and elevator machine room shall activate a shunt trip.
4. All designated "non-silenceable" auxiliary control functions shall remain in operation (even upon silencing of audible alarms) until such time as the control panel is cleared and reset manually (i.e. fan control outputs, central station interface, elevator recall interface, etc.).
5. In addition, remote annunciators shall be located where indicated. The annunciators shall duplicate the control panel alarm status indicators (for selected system zones/points) and in addition, annunciate any system trouble conditions and operate as herein specified.
6. Manual activation of a smoke exhaust damper switch shall close all smoke exhaust dampers on all floors except floor switch indicates. (Dampers are normally open).
7. Manual activation of smoke exhaust fan start switch shall turn on smoke exhaust fan in penthouse.

2.2 ALARM VERIFICATION

A. ALARM VERIFICATION shall be field programmed for each respective detector Global verification will not be acceptable The verification sequence is activated after a "check" procedure and the panel will wait a field programmable delay period (0-50 seconds) then proceed to re-sample the detector for continued presence of smoke If the alarm condition still exists or a non-verified device is actuated during the verification period, the system will then initiate all alarm sequences specified herein The system shall incorporate the ability to log in memory the number of verification events that have occurred for each selected device

2.3 SYSTEM TROUBLE DETECTION

A. When a trouble condition is detected by the CPU, one of the system initiating alarm or SLC circuits, the following functions shall immediately occur:
1. The system trouble LED on the CPU module shall flash and the internal audible trouble device shall sound Acknowledgment of the trouble condition shall silence the audible trouble device and cause all trouble LED's to illuminate steady
2. The 640 character alphanumeric LCD annunciator shall display all applicable information via the alphanumeric display associated with the respective trouble condition and its location
3. Appropriate status change/messages shall be transmitted to the system printer

4. The system common trouble indicator on associated remote annunciators shall be illuminated as specified herein
5. Appropriate status change messages shall be transmitted to the system printer

2.4 ZONING

A. The system shall have the inherent capability to employ "Intelligent" smoke detectors and addressable interface devices capable of being recognized and annunciated at the main control panel on an individual basis All zoning/device location information shall be totally field programmable to exact job requirements as approved by the architect/engineer

B. The system shall utilize remote transponder panels for distributed voice communications, notification appliance circuits, and auxiliary control output circuits Remote transponder panels shall communicate with the main CPU via the SLC data loop and be capable of being intermixed on the same loop as intelligent smoke detection and control modules

2.5 FIRE ALARM CONTROL PANEL

A. The control panel shall be modular in design utilizing DISTRIBUTED solid state MICROPROCESSORS and be capable of future expansion The microprocessor based CPU shall be completely FIELD PROGRAMMABLE CPU module shall provide for programmable non-volatile RAM memory utilizing integral lithium based memory IC chips All circuitry shall be U L listed for power-limited application

B. Central Processing Unit Module (CPU)
1. The CPU shall contain and execute all custom time control functions or control-by-event programs for specified events. Time control events/programs shall be automatically overridden by priority fire alarm events. All programs shall be held in non-volatile programmable RAM memory and shall not be lost even if both system primary and secondary power failure occurs.
2. The system shall include a trouble reminder feature to alert operating personnel to the continued presence of system trouble conditions.

C. Display Interface Board (3-LCD/3-LCDXL)
1. The DIA shall provide an 960-character back-lit, Multilingual, Liquid Crystal Display (LCD). It shall provide Light-Emitting Diodes (LED's) for AC POWER; SYSTEM ALARM; SYSTEM TROUBLE; DISPLAY TROUBLE; and DISABLE.
2. The DIA shall provide a 23-key membrane keypad with control capability to command all system functions, status readouts, manual control action, and entry of any alphabetic or numeric information. The keypad shall include means to enter multiple five digit passwords to prevent unauthorized manual control or programming.

D. Control Switches
1. Acknowledge/step Switch
2. Signal Silence Switch
3. System Reset Switch
4. System Test Switch
5. Lamp Test

E. Serial Interface Board (SIB)
   1. The SIB shall provide the following interfaces:
   2. Two ports for CRT devices (RS-232c)
   3. Two ports for remote printer devices (RS-232c)
   4. One port for supervised remote LED annunciators (RS-485)

F. Loop Controller (3-SDC1/SDDC1)
   1. The 3-SDC1/3-SDDC1 shall communicate and provide power to all devices on its loop over a single pair of wires. Each signaling line circuit shall provide the capability to support up to 159 smoke detectors and 159 monitor and control modules. The 3-SDC1/3-SDDC1 shall receive digital/ANALOG information from all "intelligent" detectors and shall process this information to determine normal, alarm, trouble, and sensitivity conditions. The analog information may be used for automatic test and determination of maintenance requirements. The 3-SDC1/3-SDDC1 module shall individually monitor all "intelligent" detectors for sensitivity variation initiating a trouble condition should detector sensitivity "drift" become excessive. The system control unit shall have the capability to remotely read each detectors sensitivity, and if need be, electronically adjust the detector sensitivity as required for existing conditions within U.L. recommended limits. In addition, the system shall incorporate a "day/night" sensitivity feature.

G. Non-Lock Walk Test
   1. The system shall include a special non-lock "walk test" mode. The walk test mode can be initiated by loop, software zone, or globally as field selected. The following reports shall be capable of being generated:
      a. General results of all walk tested devices
      b. Report all un-programmed devices installed
      c. Report all programmed devices not installed
      d. Report all devices not tested

H. Automatic Detector Test
   1. The system shall include a special automatic detector test feature which permits reading and adjustment of the sensitivity of all intelligent detectors from the main control panel. In addition, the automatic test feature shall also permit the functional testing of any "intelligent" detector or addressable interface device individually from the main control panel. An automatic detector test shall occur automatically fourteen times each twenty-four hour period or be initiated manually from the FACP as desired. Automatic detector test sequencing shall be terminated upon receipt of a true alarm condition.

I. Special System Reports
   1. The system shall have the ability to generate and print, upon command, system and point status reports. Selection of 'system' read status provides the operator with global system programming information. Selection of 'point' read status provides the operator with selected individual point programming data.

J. Field Programming

1. The system shall be 100% field programmable and shall NOT require replacement of memory IC's. Systems requiring factory programming/re-programming OR REPLACEMENT OF MEMORY I.C. CHIPS shall not be acceptable. All programs shall be stored in non-volatile RAM memory. Programming shall be accomplished only after entering an appropriate and pre-selected five digit password security code. System programming mode shall not require the system to be taken off-line nor prohibit the system from performing its normal operations and routines. The system shall be capable of revising/changing programmed functions or system expansion at anytime subsequent to initialization as described herein without factory modifications or factory programming. Field programming via the use of external computers may be considered provided programming can be accomplished on-site and the owner permanently furnished with required programming apparatus and software as part of this contract.

K. Event History
1. The main fire alarm control panel shall have the resident ability to store a minimum of 1,000 events as well as a separate 1,000 event alarm-only file in chronological order of occurrence. Event history shall include all system alarms, troubles, operator actions, unverified alarms, circuit/point alterations, and component failures. Events shall be time and date stamped. Events shall be stored in non-volatile buffer memory. Access to history buffer shall be secured via five digit password security code. Systems not employing event history memory storage shall be required to furnish a printer/recorder for recording system events.

L. Power Supply
1. The power supply shall provide all control panel and peripheral power needs with filtered power as well as regulated 24VDC power for external audio-visual devices. The audio-visual power may be increased as needed by adding additional modular expansion power supplies. All power supplies shall be designed to meet U.L. and NFPA requirements for POWER-LIMITED operation on all external signaling lines, including initiating circuits and indicating circuits.
2. Input power shall be 120VAC 60Hz. The power supply shall provide internal supervised batteries and automatic charger. The power supply shall provide both positive and negative ground fault supervision, battery/charger fail condition, A.C. power fail indicators. The power supply shall also provide supervision of modular expansion power supplies as may be required.

M. Internal Dialer
1. Include internal integral dialers with control panel. In addition, provide with wireless dial-out as redudant method of dial-out capability.

2.6 VOICE COMMUNICATIONS

A. The voice communications panel shall be modular in design utilizing solid state MICROPROCESSOR circuitry

B. Communications Controls: The communications control panel shall incorporate the following controls and indicators:
1. All call
2. General alarm
3. Audio trouble LED
4. AUDIO LEVEL LED

5. Manual tone/MESSAGE select switches with LED indicators
6. Communications zone select switches and select indicators
7. Communications monitor speaker with volume control
8. Dynamic paging microphone

C. Paging
1. The microprocessor based one way paging system shall be provided with a means to selectively activate voice, tones or digitized messages to any or all zones in the system via electronic membrane touch-pad controls In addition, visual indication by zone will be provided
2. Each audio/speaker circuit will be totally supervised for opens, shorts or grounds with direct shorts prohibiting selection of the respective zone All audio circuits shall be POWER LIMITED Each speaker zone shall be provided with an amber trouble LED for circuit trouble conditions and an active/on LED indicator
3. Alarm/Paging zones shall be provided as follows:
   a. One zone each level/floor
   b. One zone each stairwell
   c. One zone each elevator bank (to include all elevator cabs in respective bank)
   d. One zone for Penthouse Equipment Room.

D. Alarm Electronics
1. The voice communications center shall be a microprocessor based, supervised, multi-function, audio generator The communications generator shall contain:
   a. Independent Voice communications CPU
   b. Non-volatile RAM memory
   c. One custom digitized message circuits
   d. Up to four selectable tone generator/oscillators
   e. Each sub-circuit of the communications center shall be fully supervised and failure of any tone oscillator or digital message generator shall revert the system to the default standby generator.
2. The system shall be provided with a custom field programmable digitized message Mechanical tape decks/drives shall be deemed unacceptable
3. The system shall be capable of amplifier capacity and expansion as required Each amplifier shall be continuously monitored electronically for proper output level Each unit shall be equipped with diagnostic indicators Each amplifier shall provide 120 watts of 25 VRMS of power Each unit shall be equipped with its own individual power/pilot LED, audio input trouble LED, battery input trouble LED, and amplifier trouble/fail LED Transfer from any faulty amplifier to the standby unit shall be fully automatic Provide amplification for 1 watts per speaker plus 35% spare capacity
4. The fire alarm alert tone shall be a slow whoop tone with standby default tone in the event the primary oscillator fails Transfer to default tone shall also be automatic upon failure of any digitized voice message

2.7 REMOTE TRANSPONDER PANELS

A. Remote transponder/control panels shall be distributed remotely throughout the facility as indicated on the drawings Transponders shall be modular in design and provide input/output interface between all field devices/equipment and main system CPU All functions of the transponder unit(s) shall be FIELD PROGRAMMABLE via the main system CPU and incorporate non-volatile RAM memory Each unit shall be capable of operating independently in default mode should communication with the main CPU be disrupted

B. The transponder shall include a resident microprocessor based CPU The local CPU shall provide each transponder with common status indicators and transponder control Each CPU module shall include local silence, reset, trouble display, lamp test, and reset capability

C. Transponders shall be provided with zone alarm indicating modules as required Each module shall provide style Y notification appliance circuits Each notification circuit shall be capable of being field programmed as conventional alarm, audio, and/or telephone circuits Output circuits shall be POWER LIMITED Each zone shall be equipped with a status and trouble LED indicator Each alarm notification circuit/zone shall be field programmable for silenceable or non-silenceable operation

D. Transponders shall be provided with auxiliary output/control relay modules as required Each module shall provide multiple SPDT field programmable output circuits Designated fan control circuits shall be provided with software assignable manual control switch as herein specified Each circuit shall be equipped with an individual status LED indicator

E. The power supply shall provide all control panel and peripheral power needs with filtered power as well as regulated 24VDC power for external audio-visual devices The audio-visual power may be increased as needed by adding additional modular expansion power supplies All power supplies shall be designed to meet U L and NFPA requirements for POWER-LIMITED operation on all external signaling lines, including initiating circuits and indicating circuits

F. Provide 120VAC, 20 amp, 60Hz dedicated emergency circuit. The power supply shall provide internal supervised batteries and automatic charger. The power supply shall provide both positive and negative ground fault supervision, battery/charger fail condition, A.C. power fail indicators.

G. Each transponder shall provide a minimum of 1 watts of audio amplification per speaker plus 35% spare capacity

2.8 FIELD DEVICES

A. Multi Criteria Smoke Detectors :
   1. Intelligent multi criteria Smoke and Thermal Detection.
   2. Intelligent multi criteria Smoke and CO Detection
   3. Intelligent multi criteria Smoke, Thermal and CO Detection.

4. The intelligent multi criteria detectors shall be an addressable device that is designed to monitor a minimum of photoelectric and thermal technologies, photoelectric and CO technologies and photoelectric, thermal and CO technologies in a single sensing device. The design shall include the ability to adapt to its environment by utilizing a built-in microprocessor to determine its environment and choose the appropriate sensing settings. The detector design shall allow a wide sensitivity window, no less than 1 to 4% per foot obscuration. This detector shall utilize advanced electronics that react to slow smoldering fires and thermal properties all within a single sensing device.
5. The microprocessor design shall be capable of selecting the appropriate sensitivity levels based on the environment type it is in (office, manufacturing, kitchen etc.) and then have the ability to automatically change the setting as the environment changes (as walls are moved or as the occupancy changes).
6. It shall also include the inherent ability to distinguish between a fire condition and a false alarm condition by examining the characteristics of the CO, thermal and smoke sensing chambers and comparing them to a database of actual fire and deceptive phenomena.
7. The detector shall be semi-flush ceiling mounted and be provided with modular detector head with twist-lock base.

B. Intelligent Duct Detector
1. Duct mounted "intelligent" photoelectric smoke detectors shall be provided where shown on the drawings. Detectors shall operate on the same principles and exhibit the same basic characteristics as area type "intelligent" photoelectric smoke sensors. The detector shall operate in air velocities of 100 FPM to 4,000 FPM. Each detector shall interface directly to the system SLC loop without the requirement of interface zone modules.
2. The unit shall consist of a clear molded plastic enclosure with integral conduit knockouts. The unit shall be provided with clear faceplate cover to provide visual viewing of detector/sensor for monitoring sensor operation and chamber condition. The duct housing shall be provided with gasket seals to insure proper seating of the housing to the associated ductwork. Each unit's sampling tubes shall extend the width of the duct and be provided with porosity filters to reduce sensor/chamber contamination. Detectors shall be installed per NFPA 90A, and be listed with the fire alarm control panel. A remote LED shall be located on the corridor ceiling adjacent to the respective detector where detectors are not plainly visible or concealed from view.
3. Duct detectors shall be powered through fire alarm system and shall not require independent line voltage circuits for any operation condition

C. Intelligent Thermal Detectors
1. Fixed temperature, thermal detectors shall be provided where indicated on the drawings The detectors shall use dual electronic thermostats to measure temperature levels in the chamber and shall, on command from the control panel, send data to the panel representing the analog temperature level
2. The detectors shall provide dual alarm and power/status LED's Status LED's shall flash under normal conditions, indicating that the detector is operational and in regular communication with the control panel Both LED's may be placed into steady illumination by the control panel, indicating that an alarm condition has been detected An output connection shall also be provided in the base to connect an external remote alarm LED
3. The detector shall be semi-flush ceiling mounted and be provided with modular detector head with twist-lock base

D. Addressable Manual Stations
   1. Manual pull stations shall be provided where indicated on the drawings
   2. Manual stations shall be designed for semi-flush mounting on standard electrical box The station shall be constructed of hi-impact red molded Lexan with instructions for station operation in raised white letters Stations shall be of the dual action type
   3. In gymnasiums, provide all pulls tations with integral-horn protectors

E. Monitor Module
   1. Addressable single and dual monitor modules shall be provided where required to interface to contact alarm devices The monitor module shall be used to connect a supervised zone of conventional initiating devices to an intelligent SLC loop

F. Control Module
   1. Control/relay modules shall be provided where required to provide audible alarm interface and/or relay control interface The control module shall be used to connect a supervised zone of conventional indicating devices to an intelligent loop The zone may be wired class A or class B - field selected The control module may be optionally wired as dry contact (form C) relay
   2. A status LED shall be provided which shall flash under normal conditions, indicating that the control module is operational and in regular communication with the control panel The LED shall illuminate steady when the device is actuated via the fire alarm control panel

G. Remote LCD Alpha-Numeric Annunciators
   1. Provide where indicated on the drawings, 640 character remote LCD alpha-numeric annunciator or approved equal to annunciate all system events and duplicate the displayed status at the main FACP. The annunciator shall be a backlit eighty-character LCD display and operate via the system RS485 or RS232 serial output terminal from the main FACP. The LCD display shall automatically illuminate upon receipt of an alarm or trouble condition. The illumination source shall extinguish during normal/standby mode to conserve power. The unit shall operate from FACP 24VDC power and function during system power failure while the system resides on standby batteries. The remote LCD annunciator shall include:
      a. Integral time-date clock
      b. Time-date select switch
      c. Time-date/contrast adjust
      d. Display/step switch
      e. System reset
      f. System silence
      g. System acknowledge
      h. Integral trouble buzzer
      i. Point enable/disable capability
      j. Full QWERTY keypad for system programming.
   2. Annunciator shall upon command display the first system alarm, last alarm, and system alarm count. The unit shall be equipped with an integral lamp test feature. The unit shall be semi flush mounted where shown.

H. Speakers

1. Speakers shall be listed under U.L. standard 1480, meet all specifications of the Life Safety Code and be capable of reproducing both tone alerts and voice communication instructions. Speakers shall be Genesis GCHFWF-7 Speakers and shall have built in matching transformer, field selectable multiple power taps and circuitry for speaker/line supervision. Speakers shall be provided with screw terminal connection points.
2. Speakers shall be 7" square or round with textured white decorative grill. Speakers shall be tapped to produce a minimum sound-pressure level of 87 dBA at 10 feet. Speakers shall be wall or ceiling mounted as located on the drawings.

I. Speakers with Integral Strobe Light
1. Speakers shall be listed under U.L. standard 1480, meet all specifications of the Life Safety Code and be capable of reproducing both tone alerts and voice communication instructions. Speakers/strobe units shall be Genesis GCHFWF-S7VMC Series. Speakers shall have built in matching transformer, field selectable multiple power taps and circuitry for speaker/line supervision. Speakers shall be provided with screw terminal connection points. Speaker/Strobes shall be white. Each speaker/strobe shall be equipped with an integral high intensity visual alarms shall be Xenon strobe type producing a minimum of 15 candela on a 24 VDC limited energy supervised circuit. Each strobe light shall be capable of providing multi candela output. Alarm devices shall be designated to be wall or ceiling mounted as indicated on the drawings. Signals shall operate in unison with audible alarm appliances. High intensity visual signals shall be of solid state low current design and listed to U.L. Standard 1971. All strobe lights shall be synchronized.

J. High Intensity Visual Signals
1. Strobe lights where shown on the drawings. High intensity visual signals shall be installed where shown on the drawings and as may be required by the Americans with Disabilities Act (Public Law 101-336), Texas Accessibility Standards and NFPA 72, Chapter 6. Strobe lights shall be white.
2. High intensity visual alarms shall be Xenon strobe type producing a minimum of 15 candela on a 24 VDC limited energy supervised circuit. Each strobe light shall be capable of providing multi candela output. Alarm devices shall be designated to be wall or ceiling mounted as indicated on the drawings. Signals shall operate in unison with audible alarm appliances. High intensity visual signals shall be of solid state low current design and listed to U.L. Standard 1971. All strobe lights shall be synchronized.

K. Electronic audio visual devices Electronic Audio Visual Devices
1. Audible/Visual alarm devices shall be electronic horn/strobe units, to be located where indicated on the drawings. Electronic device shall not contain any vibrating electro-mechanical solenoids or contacts for reliability and performance. Electro-mechanical devices shall not be considered as equal. Units shall operate at 24VDC and be polarized supervised. Each unit shall provide a choice of three difference audible tones capable of being field selected. Preferred alarm signals shall be a pulsing tone producing a sound pressure level of 91 dBA. The visual device shall use Xenon strobe type producing a minimum of 75 candela on a 24 VDC limited energy supervised circuit and meet the requirements of ADA. Strobe unit shall automatically flash upon operation of the horn. Horn/strobe unit shall be provided in textured white finish and be flush mounted. Refer to floor plans for candela intensity required. All strobe lights shall be synchronized.

L. Sprinkler Waterflow Switch
   1. Sprinkler waterflow switches shall be installed where indicated on the drawings. Each unit shall contain one set of SPDT alarm contacts. Waterflow switches shall be provided and installed by the fire protection contractor, and connected by the fire alarm contractor.

M. Sprinkler Valve Supervisory Switch
   1. Sprinkler valve supervisory switches shall be installed on each valve as indicated on the drawings. Each unit shall contain on set of SPDT contacts. Sprinkler valve supervisory switches shall be provided, installed, and adjusted by the fire protection contractor, and connected by the fire alarm contractor.

N. Auxiliary AHU Relays
   1. Relays shall be provided for HVAC and AHU control and interface. Relays shall be heavy duty type and rated up to 10 amps at 24 VDC, 60 HZ. Relays shall be provided with NEMA I dust cover assembly and be provided with SPDT contacts as well as activated LED indicator. All interface relays shall be connected to a supervised notification appliance circuit.

O. Field Charging Power Supplies
   1. Provide power supplies with battery backup as required. Provide emergency 120 volt 20 amp dedicated circuit to each power supply.

P. Door Hold Opens
   1. 24V DC, serviced through fire alarm power supplies. Line Voltage operation is not acceptable.

Q. Provide AES 7707P-88-ULP-M IntelliNet 2.0 Fire Subscriber to communicate with district central station.

PART 3 - EXECUTION

3.1 DESIGN CRITERIA

A. The contractor shall provide drawings for Owner, Engineer and Fire Marshall's approval.

B. Drawings shall be prepared by a state licensed alarm planning superintendent.

C. Drawings shall comply with all local, state and federal code. These include but not limited to N.E.C., U.L., NFPA, Etc.

D. Locate the fire alarm control panel in the day room unless otherwise directed by Owner.

E. Locate a remote annunciator in the Fire Command Room.

F. Additional items required above minimum codes include the following:
   1. Pull Stations – All exits including exit stair wells on multi story buildings and at the FACP.
   2. Smoke Detectors – Paths of egress, electrical rooms, mechanical rooms, MDF, IDF, storage rooms, top of stairs, elevator machine room, top of elevator shaft, above each fire alarm panel and remote power supplies terminal cabinets.
   3. Duct type smoke detectors – all air handling units over 2000 CFM in duct work or return air paths.
   4. Heat Detectors – Shops, kitchens, coffee bars, central plants, boiler room and truck bays.
   5. Flow switches – Sprinkler riser.

6. Horn - throughout the building.
7. Strobes – throughout the building.
8. Remote Power supplies: Locate in mechanical rooms, electrical rooms, MDF or other areas approved by Owner.
9. Smoke Detectors with low frequency sounder bases in all sleeping rooms.
10. Monitor Fire Pump.

3.2 INSTALLATION

A. Wiring:
1. All wiring shall be in accordance with NFPA 72 and the National Electrical Code, Local Codes, and article 760 of NFPA Standard 70 All wiring sizes shall conform to recommendations of the equipment manufacturer, and as indicated on the engineered shop drawings
2. Limited energy FPLP wire shall be installed provided such wire is U.L. Listed to U.L. TEST 910 for such applications and is of the low smoke producing fluorocarbon type and complies with NEC Article 760 if so approved by the local authority having jurisdiction.
3. All wiring for SLC signaling circuits shall be of the twisted, low capacitance type to guard against outside RF and EMF interference and induced noise
4. Provide CTC 2 hour fire rated cable for all risers When not insulated a 2 hour chase or in non sprinkled areas
5. All wiring shall be run in a supervised fashion (i e no branch wiring or dog-legged wiring) per NFPA requirements such that any wiring disarrangement will initiate the appropriate trouble signals via the main control panel per NFPA and U L requirements
6. Wiring splices shall be kept to a minimum with required splices to be made in designated terminal boxes or at field device junction boxes Transposing or color code changes of wiring will not be permitted End-of-line supervisory devices shall be installed with the last device on the respective circuit Said device shall be appropriately marked designating it as the terminating device on the respective circuit
7. No A C wiring or any other wiring shall be run in the same conduit as fire alarm wiring

B. Open Wiring
1. Systems utilizing open wiring techniques with low smoke plenum cable
2. Support wire clear of knock out panels, access panels, and maintenance spaces for equipment Wire and cable shall be run using wire management techniques supporting cable as close as possible to within one foot of the floor or roof rafters Wire supports shall be directly fastened to the structure on a maximum of five foot centers Wire routing shall be parallel and perpendicular to building lines The wire and cable shall be secured with tie wraps or carrier wire Sagging in excess of three inches will not be allowed nor will bending of the supporting ring structure

C. Conduit/Raceway
1. Conduit and raceway system shall be installed in the garage areas

D. Minimum Wire Sizes Shall Be As Follows:
1. Signaling Line Circuits: 18 AWG Twisted (Low Capacitance)
2. Notification Appliance Circuits: 14 AWG
3. Relay Control Circuits: 18 AWG
4. Speaker Circuits: 16 AWG Twisted

5. Telephone Circuits: 18 AWG Twisted/Shielded

E. All wire shall be plenum rated.

3.3 TEST AND REPORTS

A. A state licensed and factory trained technical representative of the manufacturer shall supervise the final control panel connections and testing of the system Upon completion of the acceptance tests, the owner and/or his representatives shall be instructed in the proper operation of the system Instruction shall be 4 hours minimum

B. The installing contractor shall functionally test each and every device in the entire system for proper operation and response In addition, each circuit in the system shall be fully tested for wiring supervision Any items found not properly installed or non-functioning shall be replaced or repaired and re-tested

C. The installing contractor shall provide a complete written report on the functional test of the entire system A copy of the test report shall be provided with maintenance manuals The test report shall be signed and dated by the licensed fire alarm superintendent responsible for supervising the final system test and checkout

D. The installing contractor's fire alarm superintendent shall test the entire system in the presence of the local authorities having jurisdiction The contractor shall be responsible for making any changes, adjustments, or corrections as may be required by the local authorities

E. It is the intent of these specifications and of the architect/engineer that a continued program of system maintenance be continued by the owner in compliance with NFPA Standard 72, Chapter 7 It is mandatory that the installing contractor shall provide such services and make available these services to the owner upon completion of the project

3.4 WARRANTY

A. The fire alarm system, including labor and material, shall be free from defects in workmanship and materials, under normal use and service, for a period of Five (5) years from the date of acceptance or beneficial occupancy, whichever shall occur first Any equipment or workmanship shown to be defective shall be repaired, replaced or adjusted during normal working hours at no cost to the owner

B. The equipment manufacturer shall be represented by a local service organization and the name of such shall be furnished to the Owner, Architect, and Engineer

3.5 FLOOR PLANS

A. Provide a 1/16" = 1'-0" floor plan on each floor showing all devices and zoning Zoning shall correspond to the zone on the fire alarm control panel The floor plans shall be framed with a glass cover and located by the fire alarm control panel and by the remote annunciator Provide a sample for approval

END OF SECTION 28 46 01

SECTION 31 05 00 - EARTHWORK

PART 1 - GENERAL

1.1 SECTION INCLUDES:

A. All earthwork operations performed in this work are to be performed according to this Section.

1.2 RELATED SECTIONS:

B. Additional select fill and fill may be required to bring the building slab and under pavement elevation up to the required finish elevation. It is the contractor's responsibility to make this determination prior to submitting his bid.

1.3 PRODUCT HANDLING:

A. Protect all materials of this Section before, during, and after installation, protect all objects designated to remain, and protect the installed work of other trades. In the event of damage to any of these items, immediately make all repairs or replacements necessary.
B. Take all means necessary to control dust on or near the work if caused by operations during performance of the work of the Section and if resulting from the condition in which the Contractor leaves the site.
C. Use of Explosives is not permitted.

1.4 PROTECTION:

A. Protect objects designated to be preserved.
    1. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards caused by earthwork operations.
B. Schedule and execute work with consideration for neighbors and the public to prevent injury to all persons and property.
C. Avoid interference with the use of, and passage to and from, adjoining buildings and facilitates.
D. Prevent the spread of dust.
E. Maintain all benchmarks, monuments, and established limes and grades.
F. Barricade open excavations occurring as part of his work and post with warning lights. Operate warning lights as recommended by authorities having jurisdiction.

1.5 QUALITY ASSURANCE:

A. Codes and Standards: Perform excavation work in compliance with applicable requirements of authorities having jurisdiction.

1.6 EXISTING UTILITIES:

A. Locating existing underground utilities in areas of excavation work. If utilities are indicated to remain in place, provide adequate means of support and protection during earthwork operations.
B. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
C. Do not interrupt existing utilities serving facilities occupied by Owner or others, during occupied hours, except when permitted in writing by Owner and then only after acceptable temporary utility services have been provided.
    1. Provide minimum of 48-hour notice to Architect, and receive written notice to proceed before interrupting and utility.

PART 2 – PRODUCTS

2.1 FILL MATERIAL:

A. General
   1. Free of organic matter and other deleterious substances
   2. Not contain rocks and lumps larger than 3" in greatest dimension.
   3. No rocks are permitted in the top 12" of fill.

B. Sand Cushion under floor slabs:
   1. Natural river or bank sand; washed free of silt clay loam, friable or soluble materials, or organic matter; graded in accordance with ANSI/ASTM C136, within the following limits:

Sieve Size	Percent Passing
No. 4	100
No. 14	10 to 100
No. 50	5 to 90
No. 100	4 to 30
No. 200	0

   2. Maximum thickness 2" under building slab
   3. Sand is to be damp and well compacted prior to placing concrete.
   4. Sand fill is not to be used under walks or pavement areas.

C. Select Fill layer under the floor slab, walks, and paving.
   1. Uniformly blend clayey sand.
   2. Plasticity Index: Between 6 and 15
   3. Liquid Limit less than 35 percent.

D. Planting areas: Provide imported material to comply with the following:
   1. 14" of select sandy loam.
   2. Not frozen or muddy.
   3. Free from subsoil, slag, clay, stones, lumps, live plants, roots, sticks, noxious weeds, and similar foreign matter.

E. Utility line backfill:
   1. Reuse excavated materials complying with A above except as follows.
   2. At landscaped areas seal the top of trenches with 12" of clay having a P.I. over 12.
   3. Where the trench enters the building areas provide a 2' long clay plug in trenches.
   4. Provide Select Fill where indicated.
   5. Do not use sandy materials in trenches as backfill at the exterior grade beams or utility lines within 10 feet of the exterior walls.

F. Exterior backfill at grade beams:
   1. Reuse excavated materials complying with as follows.
   2. The top 18" is to be Select Fill.

PART 3 - EXECUTION

3.1 EXISTING CONDITIONS

A. Confirm and locate all existing abandoned utility lines and disconnect and cap as required.
B. Locate all active utility lines traversing the site and protect.
C. The existing paving is to remain in place as long as possible to limit drying of the upper expansive soils.

3.2 EXCESS WATER CONTROL:

A: General:
   1. Maintain exposed subgrades and fill material at optimum moisture until concrete is placed.
   2. Do not place, spread, or roll any fill material during unfavorable weather conditions.
   3. Flooding
      a. Provide beams or channels to prevent flooding of subgrade.
      b. Promptly remove all water collecting in depressions.

B. Corrective Procedures for soil that has been softened or eroded by heavy rainfall or flooding or by placement during unfavorable weather:

1. Replace soil.
2. Soils may be aerated.
3. Recompact as described for fill and compaction after the required optimum moisture content is obtained.

3.3 FROST PROTECTION:

A. When freezing temperatures may be expected, do not excavate to the full depth indicated unless the footings or slabs are to be poured immediately after the excavation has been completed.
B. If placing of concrete is delayed, protect the bottoms of excavations from frost until concrete is placed.

3.4 SITE STRIPPING:

A. Strip surface paving only where necessary to obtain the finish grades indicated.
B. Maintain exposed soils between -0 and +3 percentage points above optimum moisture content continuously.

3.5 EXCAVATING:

A. General
   1. All material to be excavated shall be considered as nonclassified, including all materials to be encountered excavating and grading.
   2. The contract price is understood to cover the removal of all such materials to the depth and extent indicated.
   3. Where depressions result from, or have resulted from, the removal of surface or subsurface obstructions, open the depression to equipment working width and remove all debris and soft material.
   4. Excavate subgrade as required to allow for finish grades shown on the Drawings or otherwise required for proper completion of the work.
   5. Excavate to elevations and dimensions indicated, allowing ample space for select fill and other construction operations.
   6. Carefully schedule the work so that existing soils are exposed for minimum duration.
B. Rock (if encountered)
   1. Level off (or shelf) all rock surfaces to a slope not exceeding 1" per foot, or as otherwise directed, before placing concrete.
   2. Excavate all rock to a depth of 6" below the required sub-grade.

3.6 PREPARATION OF SUBGRADE:

A. General:
   1. Remove all ruts, hummocks, large clods, and other uneven surfaces.
   2. Maintain the specified moisture contents on a daily basis until additional fills, paving or floors are placed.
   3. Secure the Testing Agency's approval of each operation before proceeding with the nest operation.
B. Plant Areas
   1. Water or aerate the subgrade to obtain a moisture content at or above optimum and lightly compact.
   2. Recompact to the following percentage of the maximum dry unit weight per ASTM D-698: 93% to 98% Standard Proctor.
C. Paving and walk areas:
   1. Place select fill if required and/or paving direction on the existing paving where the overlay depth allows placement of the full thickness of specified paving.
   2. If required as indicated by the testing lab remove any soft, loose, wet, weak or highly organic soils.
      a. Proofroll existing subgrade with heavy pneumatic tired equipment (10 ton minimum weight) and further test by probing as necessary to check and define pockets of unacceptable materials.
      b. Remove any loose or soft zones of soil that deflect excessively.
   3. Water or aerate the subgrade to maintain exposedsoils between -0 and +3 percentage points above optimum moisture content continuously.

4. Recompact to the following percentage of the maximum dry unit weight per ASTM-698: 92% to 98% Standard Proctor.

D. Building Areas:
   1. Subgrade in areas to be filled should be stripped of vegetation and any deris present.
   2. Preparation of exposed subgrade:
      a. Overexcavate if necessary to ensure placement of not less than 36" of select fill.
      b. Proofroll existing subgrade with heavy pneumatic tired equipment (10 ton minimum weight) and further test by probing as necessary to check and define pockets of unacceptable materials.
      c. Remove any soft, loose, wet, weak or highly organic soils or soft zones that deflect excessively.
      d. Prior to placing select fill the subgrade should be scarified to a depth of eight or more inches and uniformly compacted to a minimum of 94 percent od ASTM D 698 at a minimum of +1 percentage point above optimum moisture.
   3. Limit disturbances to the existing paving to essential areas.

3.7 FILL AND COMPACTION:

A. After subgrade has been approved, spread additional fill material it required in layers not to exceed 9" in
uncompacted thickness.
B. Water or aerate the fill material to obtain the following moisture content as determined by ASTM D-698:
   1. Select Fill: -1 to +2 percentage points of optimum moisture content
   2. Excavated Fill: -0 to +1 percentage points of optimum moisture content
C. Compact fill soils to obtain the following maximum dry density as determined by ASTM D-698:
   1. Select Fill: 95% to 100% Standard Proctor.
   2. Excavated Fill: 94% to 98% Standard Proctor.
D. Maintain the specified moisture contents on a daily basis until additional fills or concrete is placed.
E. Secure the Testing Agency's approval of each operation before proceeding with the next operation.

3.8 GRADING:

A. Grading of the site has been performed to the elevations indicated on the Drawings or otherwise required for proper drainage and completion of the work. Grades are to at least the following tolerances:
   1. Rough Grade:
      a. Building and pavement areas — Plus or minus 1'
      b. Lawn areas — Plus or minus .3'
   2. Finish Grade:
      a. Building and pavement areas- — Plus or minus .05'
      b. Lawn areas — Plus or minus .1'
B. If the finished grades shown by spot elevations conflict with those shown on contours and drawings, the spot elevation shall govern and additional work will be required.

C. Unless indicated otherwise, Project Site areas outside of buildings shall be given uniform slopes between points and existing established grade.

3.9 SPREADING TOPSOIL:

A. Place topsoil to all disturbed areas not covered by buildings, walks, or paving.
B. Remove foreign materials, plants, roots, stones, and debris from site.
C. Place during dry weather, and or dry unfrozen subgrade.
D. Spread topsoil to a minimum depth of 6".
E. Cultivate to a depth of 8" with mechanical tiller. Cultivate inaccessible areas by hand.
F. Grade to eliminate rough spots and low areas where ponding may occur.
G. Rake smooth and remove rubbish, dead vegetation and rocks or lumps over 1-1/2".
H. Maintain soil in a smooth, uniform grade.

I. Compact finished topsoil sufficiently to prevent sinkage pockets when watered.
J. Install additional topsoil as necessary at eroded areas.

3.10 TRENCHING:

A. Make all trenches of sufficient width to provide free working space at both sides of trench.
B. Open vertical construction is limited to trenches less then 5' deep. If depths exceeding 5' are necessary, the adjacent top surfaces shall be graded off at maximum 33% horizontal slope to ensure that no portion of an open vertical construction trench is deeper than 5 feet.
C. Where invert elevations are not shown, trench to a sufficient depth to give a minimum of 18" of fill above the top to exterior pipe measured from the adjoining finished grade.
D. Where trench excavation is inadvertently carried below proper elevations, backfill and compact to provide a firm and unyielding subgrade and/or foundation to the approval of the Architect.
E. Properly support all trenches. Brace, sheet, and support all trench walls in such a manner that they will be safe and that the ground alongside the excavation will not slide or settle, and that all existing improvements of every kind will be fully protected from damage. In the event of damage, immediately make all repairs necessary.
F. Arrange all bracing, sheeting, and shoring so as to not place stress on any portion of the completed work until construction has proceeded far enough to provide ample strength.
G. Exercise care in the drawing or removal of sheeting, shoring, bracing and timbering to prevent collapse or caving of the excavated faces being supported.

3.11 DEWATERING:

A. Promptly remove and properly dispose of water entering the excavation or the other parts of the work. Ensure a dry excavation and preservation of the finish lines and grades of the bottom of excavations.
B. Dispose of water in a suitable manner without damage to adjacent property. Do not drain water into work being built or under construction. Dispose of water in such a manner as to not menace public health.

3.12 FOUNDATION FOR PIPES:

A. Grade the trench bottom to provide a smooth, firm and stable foundation at every point throughout the length of the pipe.
B. Place pipe barrel on a minimum of 6" of imported select fill material compacted to a dry density of 90 percent as determined by ASTM D-698 Standard Proctor. DO NOT USE SAND.

C. In areas where soft, unstable materials are encountered at the surface upon which the fill material is to be placed, remove the unstable material and replace with material approved by the Architect.
D. At each joint in the pipe, recess the bottom of the bedding as required in such a manner as to relive the pipe of all lad and to ensure continuous bearing of the pipe barrel on the firm foundation.

3.13 BEDDING FOR PIPES:

A. Place fill material in the trench simultaneously on each side of the pipe for the full width of the trench to a maximum depth of 3'.
B. Take special care to provide a firm bedding support on the underside of the pip and fittings for the full length of the pipe.
C. Place additional lifts as required to extend the bedding material 12" above the top of the outside diameter of the pipe barrel.

3.14 TREATMENT AFTER COMPLETION OF GRADING:

A. After grading is completed, permit no further excavation of filling except with the approval of the Architect.

3.15 DEBRIS AND EXCESS MATERIAL:

A. Completely remove from the site and dispose of all debris and excess material resulting from the work of this section.

END OF SECTION 31 05 00

SECTION 31 31 16 - TERMITE CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SECTION INCLUDES

A. Furnishing and applying both pre-construction and post-construction subterranean termite control treatment as described herein on the Project.

1.3 COORDINATION

A. Each offeror shall be responsible for determining during the proposal period the extent that any addenda issued during the proposal period may affect this Section of the Specifications.

B. Reference instructions to offerors for requirements regarding substitutions of materials and products.

C. Where conflicts occur between the Drawings and Specifications, between different drawings, between portions of this Section of the Specifications, or between different sections of the specifications, the more stringent requirements and the greater quantity shall apply.

D. Contractor shall notify Structural Pest Control Board (SPCB) prior to application of termite treatment at the site as required by law.

E. Comply with all federal, state, and local requirements and authorities having jurisdiction.

1.4 QUALITY ASSURANCE

A. Applicator shall be bonded and licensed with all applicable authorities.

B. Products and application techniques shall meet all requirements of federal, state, and local regulations regardless of products and techniques specified herein.

1.5 SUBMITTALS

A. Product Data:
   1. Manufacturer’s printed literature describing products and detailed application requirements.
      a. Document that product is currently allowed by the Environmental Protection Agency (EPA), the State of Texas, and all applicable county and local authorities for use under building slabs.
   2. Material Safety Data Sheet (MSDS).

B. Samples:
      a. Of proposed written warranty.

C. Certification:
   1. After the completion of Work under this Section, submit as part of the Close Out Documents, manufacturer's affidavit from the Pest control Company stating that "The building has received a complete treatment for the prevention of subterranean termites, and that treatment is in accordance with rules and laws established by the Florida Department of Agriculture and Consumer Services."
   2. After completion of Work under this Section, submit manufacturer’s signed affidavit, verifying specification compliance of the chemicals, their proportions, and application.
   3. Contractor shall certify that pesticide used on project does not contain the chemical or have any ingredient known as “Dursban”.

1.6 WARRANTY

A. Provide written warranty against defects in materials and application for a period of five (5) years after application.

B. Defects shall include, but not be limited to the following:

1. Evidence of activity by subterranean type termites.
2. Damage of building materials due to subterranean termites.

C. During the warranty period the applicator shall, at his own expense provide additional termite treatment as required to prevent termite activity. Repair or replace building materials damaged by subterranean termite activity during the warranty period at no expense to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Termidor 80 WG Termitcide/Insecticide (EPA Reg. No. 7969-209) as manufactured by BASF Corporation, Florham Park, NJ; (973) 245-6000 or comparable product approved by Architect with minimum five (5) years of experience manufacturing products meeting or exceeding the specifications and comply with Division 1 requirements regarding substitutions in order to be considered.

2.2 MATERIALS

A. Dry powder containing 80% active ingredient and is conveniently package in water-soluble packages (paks).

B. Finished dilution: 0.125%.

PART 3 - EXECUTION

3.1 PREPARATION

A. Inspect building earth fill and foundation excavation for readiness and to ensure that soils are not too wet for proper application of treatment.

B. Post conspicuous warning signs indicating date(s) and time(s) of application and notify contractors working in area of such date(s) and time(s).

3.2 MIXING

A. Mixing shall be in accordance with manufacturer’s printed instructions.

3.3 APPLICATION

A. Do not apply while school is in session.

B. Apply to ensure a continuous chemical barrier.

C. Pre-Construction Treatment:
1. Apply an overall treatment to the entire surface of soil or other substrate to be covered by the slab, including areas to be under carports, porches, basement floor, and entrance platforms in accordance with manufacturer’s printed instructions and recommended application rates.
2. Apply along inside of foundation walls, and around plumbing, bath traps, utility services, and other features that penetrate the slab in accordance with manufacturer’s printed instructions and recommended application rates.
3. Apply at crawl spaces, at hollow block foundations or voids in masonry resting on the footing, and at plenums in accordance with manufacturer’s printed instructions and recommended application rates.

D. Post-Construction Treatment:
1. Apply a treatment under the slab, including attached porches, carports, entrance platforms, garages and similar slab structures in accordance with manufacturer’s printed instructions and recommended application rates. Drill all holes spaced in a manner to allow for application of a continuous chemical barrier. Plug and fill all drill holes in occupied areas or where visually exposed with a suitable sealant recommended by manufacturer.
2. Apply at existing cracks and cold, construction and expansion joints and around bath traps, plumbing and utility services which penetrate the slab in accordance with manufacturer’s printed instructions and recommended application rates.

3. Apply at crawl spaces in accordance with manufacturer's printed instructions and recommended application rates.
4. At perimeter grade beams, trench along beams or use rodding as recommended by the manufacturer. The final treatment of the exterior beam will be performed within 30 days of notification of completion of landscaping or one (1) year from the date of completion of construction.
5. Allow for drying after application, in accordance with manufacturer's instructions, before placing vapor barrier and beginning concrete placement or other construction activities.
6. All treatment applications must be in compliance with all federal, state, and local laws and regulations with regard to mixing, applying, and disposing of debris and waste.

END OF SECTION 31 31 16

SECTION 31 32 00 – SUBGRADE AND ROADBED

PART 1 - GENERAL

1.1 SECTION INCLUDES:
A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification sections, apply to work of this section.

1.2 RELATED SECTIONS
A. Coordinate the work of this Section with the Work of other Sections as required to properly execute the Work and as necessary to maintain satisfactory progress of the work of other Sections. Other Sections containing related work include but are not limited to the following:

1.3 SCOPE: This Section shall govern for the preparation of the subgrade primarily under the sidewalk, which is not to receive lime treatment. Work included in this Section, while not all inclusive but listed as a guide, shall include:
A. Furnishing of all labor, tools, equipment and incidentals to complete the work.
B. Layout of the work.
C. All required excavation within the limits of the work area.
D. Removal, proper utilization or disposal of all excavated material.
E. Compacting, shaping and finishing of all subgrade in conformity to the alignment, cross section, and elevation shown on the plans.
F. Sprinkling for Dust Control.

1.4 TEST REPORTS: Submit complete laboratory analysis of soil material proposed for fill material.
A. Establish moisture density relationship of in-place sub-grade in accordance with ASTM D-698.
B. Establish moisture density relationship of proposed select fill(s) material in accordance with ASTM D-698.
C, Perform PI test on proposed select fill material to confirm conformance with the project specifications in accordance with ASTM D-4318.

PART 2 - PRODUCTS

2.1 EQUIPMENT: All equipment necessary for the construction of this item shall be suitable for the work considering the confined work area and shall be approved by the Resident Engineer as to condition before the contractor shall be permitted to begin construction operations on which the equipment is to be used. Hand operated mechanical tampers may be used.

2.2 SELECT FILL: Shall be select non-expansive sandy clay or clayey sand fill with a Plasticity Index (P.I.) of 4 to 12 and a Liquid Limit of 30% or less.

2.3 MATERIALS: Water shall be furnished by the Contractor and shall be clean, free from industrial waste and other objectionable matter.

PART 3 - EXECUTION

3.1 GENERAL: After the excavation or embankment has been substantially completed, the subgrade shall be brought to the proper alignment, cross-section and elevation, so that after rolling and subsequent finishing operations, it shall conform to the correct configuration and dimensions as indicated on plans.

3.2 COMPACTION: Compaction shall consist of the equipment operation, as herein specified and as directed by the Resident Engineer.
A. Compaction Methods: The method of compaction shall be left to the discretion of the contractor.

Each layer of fill, if dry, shall be wetted uniformly to the moisture content required to obtain the desired density and shall be compacted by means of tamps or rammers.

3.3 FINISHED SUBGRADE: After completion of the compaction and immediately ahead of the application of sidewalk, the subgrade shall then be tested with templates or stringlines by the Contractor. All irregularities which develop in excess of one-half inch in a length of 16 feet (12.5 mm in 5M) measured longitudinally shall be corrected by loosening, adding or removing material; reshaping; and recompacting by sprinkling and rolling. The completed subgrade shall have a uniform density of not less than 90 percent of the maximum density determined by ASTM D 698. Moisture content shall be within minus 2 to plus 4 of optimum.

The subgrade shall be maintained in a smooth, compacted condition, in conformity with the required section and established grade, until the sidewalk is placed, and shall be kept wetted down sufficiently in advance of placing any sidewalk to insure its being in a firm and moist condition for at least two inches below surface of the prepared subgrade. Only such subgrade as is necessary for the satisfactory prosecution of the work shall be completed ahead of the placement of sidewalk. Complete drainage of the subgrade shall be provided at all times.

3.4 SPRINKLING FOR DUST CONTROL: Sprinkling for dust control shall consist of the authorized application of water on those portions of the projects as shown on the plans or as directed and herein specified.

The Contractor shall operate a sprinkler which shall insure the distribution of water in a uniform and controllable rate of application. It shall be the Contractor's continuous responsibility at all times including nights, holidays, weekends, etc., until acceptance of the project by the owner, to maintain the project free of dust in a manner which shall cause the least inconvenience to the public.

3.5 COMPACTION TESTS: The completed subgrade shall be tested for compaction and moisture content at the rate of one test per 1000 sf, but in no case less than a total of five tests for the project.

END OF SECTION 28 23 00

SECTION 31 63 29 - DRILLED PIERS

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Furnish all labor, materials, services, equipment and appliances required in conjunction with drilled pier foundations complete, including, but not limited to the following:
   1. Layout of drilled piers.
   2. Excavation of drilled piers.
   3. Temporary steel casings – if required.
   4. Furnishing and placing reinforcing steel.
   5. Furnishing and placing concrete.
   6. Placing anchor bolts for steel columns.
   7. Removal of spoil (excavated material) resulting from drilled pier excavations.

B. The extent of drilled piers is shown on the drawings, including locations, diameters of shafts, elevation of top bearing stratum for bidding purposes, top of pier elevations, reinforcement, and details of construction.

C. Related work specified in other sections:
   1. Testing Laboratory Services: Section 01 40 00
   2. Soil Investigation Data: Section 01 93 00
   3. Concrete Reinforcement: Section 03 20 00.
   4. Cast-in-Place Concrete: Section 03 30 00.

2.1 QUALITY ASSURANCE

A. Pier drilling contractor shall be required to submit proof of qualifications requirements including:
   1. Minimum of 5 previous projects of similar scope and nature or larger.
   2. Verify having been in business for a minimum of three years.

B. Testing laboratory services:
   1. Refer to section 01 40 00 for additional information concerning laboratory services in conjunction with drilled pier work.
   2. The contractor shall pay for the services of an independent testing agency to design the concrete mix in conjunction with drilled piers and to perform continuous pier drilling observations.
   3. Contractor shall give a minimum of 2 days notice to geotechnical consultant for services in conjunction with drilled piers.

C. Drilling Log:
Geotechnical Representative shall keep an exact log of each pier, regardless of soil conditions, indicating:
1. Pier number.
2. Pier location.
3. Depth drilled through overburden.
4. Depth drilled in bearing stratum.
5. Elevation of ground surface.
6. Top elevation of concrete.
7. Top elevation and length of casing.
8. Diameter of shaft.
9. Diameter and type of bell (if bells are required).
10. Estimated inflow of water, source, and depth in bottom of hole when concrete is placed.
11. Description of bearing stratum.
12. Pumping required.

3.1 JOB CONDITIONS

A. Scheduling:
1. Schedule pier drilling so that piers will be filled with concrete within 8 hours after drilling.
2. Fill each pier with concrete not later than the same day it is drilled.

PART 2 – PRODUCTS

2.1 DRILLING EQUIPMENT

A. The equipment used shall be adequate to drill the sizes indicated to depths necessary for a stable foundation, giving consideration to subsurface conditions reported by the Geotechnical Investigation.

2.2 MATERIALS

A. Concrete Reinforcement: As specified in Section 03 20 00.

B. Cement, Aggregates and Admixtures: As specified in Section 03 30 00.

2.3 MIXES

A. As specified in Section 03 30 00.

PART 3 – EXECUTION

3.1 CONSTRUCTION

A. Drilling
   1. Drill piers with power auger foundation drilling rig designed for that purpose. Drill piers vertically, to diameters shown on drawings.
   2. If caving or substantial amounts of ground water are encountered, use casings, if required, to prevent caving and exclude water.

B. Casings
   1. Protective steel casing, at least as large in inside diameter as the nominal shaft size and of sufficient wall thickness to resist crushing by hydrostatic and earth pressures, shall be installed in each pier hole when needed, in the judgement of the Foundation Inspector (s), to prevent caving or fall-in.

C. Casing Removal
   1. An initial jerk of “2” to “4” shall be allowed to start the lift; thereafter, while being removed from the pier hole, the casing must be kept plumb and must be pulled with a smooth, vertical motion (no rotation permitted), without jerks. Vibration of the casing during pulling is not approved. Maintain sufficient head of concrete to prevent reduction in diameter of pier shaft by earth pressure and to prevent extraneous material from mixing with fresh concrete. Coordinate withdrawal of temporary casings with concrete placement to maintain a sufficient need of concrete above casing bottom.
   2. Where cutoff elevation is below ground level, maintain protective casing to the ground surface if necessary to prevent detrimental caving or intrusion of shallow soils into the shaft.
   3. Dowels shall be placed and positioned after the casing has been pulled and the surface of the concrete has been established.

D. Removal of Groundwater Seepage
   1. Water above an average depth of 2” above the bottom of the excavation shall be pumped or removed before placement of concrete. If water cannot be held below this level long enough for concrete to be placed in the normal manner, place concrete by one of the following methods:
      a. Use of a submersible pump in the bottom of a straight hole or in a sump excavated in the bottom of a bell, with concrete being placed to cover the intake pipe before the pump is lifted.
      b. Use of a Tremie pipe or “elephant’s truck”.
      c. Use of pumped-in concrete discharging through a pipe below the water and below the surface of the concrete in the hole.

E. Allowable Tolerances:
   1. The piers shall be installed as indicated on the Drawings and in accordance with these Specifications. No pier shall be off center from its design locations more

than 1/24 of the shaft diameter or 3”, whichever is less measured at the top of the pier. No vertical pier shall be out of plumb more than 1% of its length. All piers and shafts shall be at least as large in diameter as indicated on the Drawings. Deviations from underream configurations (if required) may be made only with prior written approval of the Structural Engineer.

2. If any of the above tolerances are exceeded, additional construction (including costs of engineering and redesign) as required by the Structural Engineer, shall be paid for by the Contractor.

3.1 PLACING REINFORCING STEEL AND CONCRETE

A. Do not place steel or concrete until pier holes have been inspected, logged and approved by the Testing Laboratory.

B. Reinforcing steel shall be installed as indicated on the Drawings. All steel shall be free from excessive rust, mud or any foreign material which would hinder bonding of concrete and steel. Reinforcement cages shall be straight and shall conform to the design dimensions. Adequate provision shall be made to ensure that the reinforcement steel will remain in place throughout placement of concrete and that specified concrete cover for the reinforcement steel is attained and maintained. The use of precast concrete spacer blocks or “Centraligner” pier sleds by Pieresearch, Arlington, TX (or equal) is recommended for this purpose.

C. After approval of the excavated pier hole by the Testing Laboratory, concrete shall be placed, if necessary, with the use of a drop chute or tremie, limiting free fall to 25’ maximum, such that will not cause segregation of the particles or permit infiltration of water or any other occurrence which would tend to decrease the strength of the concrete or the capacity of the finished pier. All concrete shall be placed in the presence of the Testing Laboratory.

D. Maintain a minimum 3” clearance between bottom of excavation and reinforcement.

3.2 DISPOSAL OF SOIL

Remove spoil from the ground around the excavation before concrete placement is started and dispose off the site in a legal manner.

END OF SECTION 31 63 29

SECTION 32 13 14 - SIDEWALKS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
- A. Drawings, Bidding Requirements, Contract Forms, Conditions of the Contract and Division 1 - General Requirements apply to the work of this section.

1.2 DESCRIPTION OF WORK
- A. Work included in this section: Concrete walks, inclines, and ramps.
- B. Related work described elsewhere:
  1. Section 31 05 00 - Earthwork

PART 2 -PRODUCTS

2.1 CONCRETE
3500 psi at 28 days.

2.2 REINFORCEMENT
#3 bars @ 18" o.c. both ways

2.3 EXPANSION JOINTS
Pre-molded joint filler at 40' o.c. maximum.

2.4 NON-SLIP FINISH
- A. Provide ¼” deep grooves at 2” o.c. on ramps and incline walks.
- B. Provide cast aluminum nosing’s at exterior steps.

2.5 DIVIDER STRIPS
Construction grade Redwood where indicated.

PART 3 -EXECUTION

3.1 PLACEMENT AND CURING
- A. Place and cure as per the requirements of Section 03 30 00.

3.2 FINISH
- A. Unless otherwise indicated, the finish will be fine hair broom finish on all exterior walks.
  1. Draw fine-hair broom across concrete surface perpendicular to line of traffic.

END OF SECTION 32 13 14

SECTION 32 33 13 - SITE BICYCLE RACKS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Exterior bicycle racks.

1.2 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Mounting surface for bicycle racks.

B. Section 05 50 00 - Metal Fabrications: Custom metal outdoor furnishings.

C. Section 32 13 13 - Concrete Paving: Mounting surface for bicycle racks.

D. Section 32 33 14 - Site Bicycle Lockers.

E. Section 32 33 15 - Site Bicycle Shelters.

1.3 PRICE AND PAYMENT PROCEDURES

A. See Section 01 23 00 - Alternates for product alternatives affecting this section.

1.4 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.

C. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2022.

D. ASTM A312/A312M - Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes; 2022a.

E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2023.

F. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.

G. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

H. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2023.

I. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.

J. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a (Reapproved 2016).

K. ASTM C330/C330M - Standard Specification for Lightweight Aggregates for Structural Concrete; 2023.

L. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements; 2023.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Shop Drawings: Indicate size, shape, and dimensions, including clearances from adjacent walls, doors, and obstructions.

D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Handle racks with sufficient care to prevent scratches and other damage to the finish.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Exterior Bicycle Racks:
1. American Bicycle Security Company: www.ameribike.com/#sle.
2. BRP by Bison, Inc: www.brpbybison.com/#sle.
3. Columbia Cascade Company: www.timberform.com/#sle.
4. Highland Products Group, LLC: www.indoorbikeracks.net/#sle.
5. Huntco Supply, LLC: www.huntco.com/#sle.
6. MADRAX, a brand of Graber Manufacturing, Inc: www.madrax.com/#sle.
7. Neenah Foundry, a division of Neenah Enterprises, Inc: www.nfco.com/#sle.
8. Reliance Foundry Co. Ltd: www.reliance-foundry.com/#sle.
9. Saris Infrastructure: www.sarisinfrastructure.com/#sle.
10. Substitutions: Refer to section 01 25 00 - Substitution Procedures.

2.2 BICYCLE RACKS

A. Exterior Bicycle Racks: Device allows user-provided lock to simultaneously secure one wheel and part of the frame on each bicycle parked or racked.
1. Style: Custom configuration as indicated on drawings.
2. Capacity: Seven bicycles.
3. Mounting, Ground: In-ground anchor.
4. Mounting, Wall: Post-installed anchor.
5. Finish: Powder coat, maintenance-free and weather-resistant.
6. Accessories: In-ground grout cover.

B. Materials:
1. Pipe: Carbon steel, ASTM A53/A53M, Schedule 40.
2. Pipe: Stainless steel, ASTM A312/A312M, Type 304, Schedule 40S.
3. Tube: Carbon steel, ASTM A500/A500M.
4. Tube: Stainless steel, ASTM A269/A269M, Grade TP304, seamless.
5. Bar, Round and Flat, Carbon Steel: ASTM A36/A36M.
6. Bar Round and Flat, Stainless Steel: ASTM A666, Type 304.
7. Molded or Extruded Plastic: 100 percent, high-density, UV stabilized polyethylene.
8. Precast Concrete:
   a. Cement: ASTM C150/C150M, Portland Type I - Normal; white color.
   b. Concrete Materials: ASTM C33/C33M aggregate, water, and sand.
   c. Reinforcing Steel: ASTM A615/A615M, deformed steel bars; unfinished, strength and size required by precast unit design.
   d. Concrete Mix: Minimum 5000 psi, 28 day strength, air entrained to 5 to 7 percent.
   e. Air Entrainment Admixture: ASTM C260/C260M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive bicycle racks.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory conditions before proceeding.

C. Do not begin installation until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Ensure surfaces to receive bicycle racks are clean, flat, and level.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install level, plumb, square, and correctly located as indicated on drawings.

C. In-Ground Anchor Installation:
   1. Prepare holes in size according to manufacturer’s instructions.
   2. Place anchoring bolts through the holes in pipe.
   3. Lower rack into holes, ensuring the bottom of lower bends are at least 1-1/2 inch from the ground.
   4. Place concrete.
   5. Level rack before concrete sets.
   6. Support until dry.

D. Post-Installed Anchors: Comply with ICC-ES AC308.

E. Surface Flange Installation: Anchor bicycle racks securely in place with 1/2 inch by 4 inch anchor bolts through flange holes.

F. Freestanding Installation: Place in location indicated on drawings.

3.4 CLEANING

A. Clean installed work to like-new condition. Do not use cleaning materials or methods that could damage finish.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION 32 33 13

THOMAS PRINTWORKS

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Dallas ISD Construction Services

CSP# 208290 David W. Carter High School

Pre-Proposal Meeting Sign-In Sheet

Monday, January 05, 2026 at 10:00 AM - Virtual Call

Monday, January 05, 2026 at 4:00 PM - In Person Walk Through

			GC/SUB
Business Name		*Representative's Name*	
Mailing Address			
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